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Virginia Medical Monthly

Official Publication of the Medical Society of Virginia

Vol. 62, No. 6. WHOLE No. 999. RICHMOND, VA., SEPTEMBER, 1935 $2.00 A YEAR 25 CENTS A COPY

SEROLOGICAL TESTS FOR ENTERIC FEVERS.

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Bacteriological evidence of enteric infection is established with certainty only on the recovery of the infecting organism. Since this is not always possible, recourse must be made to serological studies of the agglutinating properties in the patient's serum. This can best be done by using qualitative methods in the agglutination tests for enteric fevers. In this way it is possible, within limits, to differentiate between those who have had vaccine and those who have an enteric infection.

In 1924, Felix* stated that after the agglutinins which are produced by typhoid vaccination or an attack of typhoid have disappeared from the blood, they may reappear after many years under the non-specific stimulation of some non-typhoid disease. This sensitization of the body caused by an attack of typhoid or by typhoid vaccination is considered to be of lifelong duration. On can readily see the importance of information concerning whether the patient has had vaccine or a previous attack of typhoid. On very few cases are additional specimens submitted, so no opportunity is given to observe the fluctuation of agglutinins. Under these conditions every effort is made to use methods that will be of greatest aid to the physicians in the diagnosis of disease.

Whether one accepts the Felix* theory of a multiple antigen or not, it is an easily demonstrated fact that organisms of the enteric group show two distinct types of agglutination, a floccular and a granular type. By the use of two antigens a distinction can usually be made between the agglutinins due to specific stimulation in active enteric infections and those re-stimulated non-specifically by various diseases, providing a history of past enteric infection or vaccination is known.

A somatic or body antigen designated as the "O" antigen and a flagella or "H" antigen are used. The "O" antigen gives a granular, small flaking agglutination which is group specific. That is, its presence in the serum of a patient indicates an enteric infection only. The "H" antigen gives a floccular, large flaking agglutination which is species specific. It indicates which of the organisms of the enteric group caused the formation of the agglutinins.

Due to the presence of agglutinins in the serum of certain individuals resulting from vaccination or previous infection the diagnostic significance of this qualitative estimation is modified as follows:

The presence of "H" or "O" agglutinins, both of significant titre in an unvaccinated individual without previous history of enteric infection, is diagnostic of enteric infection with the species indicated by the "H" agglutinins.

In a previously vaccinated individual or one with a history of previous enteric infection, the presence of "H" agglutinins in a low titre (serum dilution less than 1 to 800) probably has no significance; whereas, the presence of "O" agglutinins in a titre of 1 to 200 is presumptive evidence of an infection.

In the examination of 5,404 blood specimens, using two killed suspensions of B. typhosus, one to demonstrate the floccular or species specific, and the other the granular or group specific properties, we find that the information we are able to give the physician is of greater significance than could be given by the use of one antigen. This is in general agreement with the findings of others who report similar studies.

*Felix, A.: The Qualitative Receptor Analyses in Its Application to Typhoid Fever. *J. Immunology*, 9:115, 1924.

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FOURTEEN HUNDRED AND FIFTEEN SPINAL ANESTHESIAS WITH SPECIAL REFERENCE TO INDICATIONS, COMPLICATIONS AND MORTALITY—WITH CASES REPORTED AND CHARTS.*

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This paper is presented as a review of the surgical services of the Chesapeake and Ohio Hospital, in Clifton Forge, and the Community House, in Hot Springs, since March 28, 1930. The presentation was inspired by our desire to learn just what our experiences have been with the use of the various methods of anesthetics which we were employing. A vast literature has been built up around the modern-day anesthetics. These reports are conflicting and offer a poor basis upon which may be established a substantial opinion as to the value of the various anesthetics in common employment.

We recognize the prime requisite of any anesthetic is safety and the anesthesia which offers the greatest degree of safety must necessarily be given great consideration. In most operations this means that the anesthetic must carry the patient through the operative procedure without damage as the result of its employment. In some instances the anesthetic must be chosen because it may actually facilitate the operative procedure by producing complete muscular relaxation. Particularly is this true in certain types of abdominal surgery. We feel that anesthesia should be looked upon from the broad view-point of anesthesia and operation, rather than from the point of view of the anesthesia alone. Our real objective in the practice of surgery is to get for our patients the complete benefit of any operative procedure employed with the minimum hazard. Unfortunately some of the anesthetics which are capable of producing complete muscular relaxation are associated with certain dangers that are actual and real.

When patients are subjected to surgery, the responsibility for their welfare is ordinarily a problem of the surgeon in charge of the case. I am of the opinion that the surgeon is best qualified, by virtue of his knowledge of the particular patient, to select the anesthetic which is to be employed. The surgeon must naturally co-ordinate the problems of his patient to the point where he may use skill and judgment in the selection of the anesthetic. Too much emphasis cannot be placed upon the necessity of full co-operation and understanding between the surgeon and the anesthetist. With due deference to the trained medical anesthetist, I may say that I am not willing for the most skilled anesthetist to select the type of anesthesia which is to be employed upon my patients.

We have had a moderate experience with some of the common anesthesias now in general use. My personal experience is reasonably wide in the use of ether, regional anesthesia, nitrous-oxide and ethylene. We have used chloroform and avertin only occasionally.

Ether probably should continue to maintain its place in general surgery as the anesthetic of choice in the hands of the average anesthetist. It is often poorly given with a relative record of safety. While it does not give the complete muscular relaxation of spinal anesthesia, it is true the relaxation is ordinarily satisfactory for the performance of the usual operative procedure. It certainly is the anesthetic of choice for the occasional anesthetist.

Extensive operative procedures may be accomplished by the use of regional anesthesia without harmful effects, but the requirement of muscular relaxation is not complete and it is often unsatisfactory particularly for abdominal surgery. Regional anesthesia is best suited to operations requiring limited fields of exposure.

Nitrous-oxide and ethylene are excellent anesthetics when one considers only freedom from latent and harmful effects. Adequate muscular relaxation is very difficult with either nitrous-oxide or ethylene unsupported by other basal anesthetics for difficult and extensive surgical procedures in the abdomen. Skilled anesthetists may give gas with a degree of

*Read before the sixty-fifth annual session of the Medical Society of Virginia, at Alexandria, Va., October 9-11, 1934.

satisfaction, but our experience has led us to recognize its limited field of usefulness. Considering, however, that group of patients who are poor surgical risks, I am inclined to think that nitrous-oxide or ethylene, combined with ether or avertin, offers the method of choice.

Spinal anesthesia, or block anesthesia, has been used by us rather extensively for the past four and one-half years. Our first experiences with this type of anesthesia led us to feel that its scope of usefulness was very wide. At no time, however, were we sufficiently enthusiastic about its use as to warrant our using it as an anesthetic of choice for operations above the diaphragm. Our personal experiences with spinal anesthesia and the study of current literature have caused us to modify our primary opinions in regard to spinal anesthesia to a point where we feel now that it is particularly useful in abdominal operations, when patients are good surgical risks or where difficult abdominal operations are anticipated requiring complete muscular relaxation for their performance.

The complications of injuries to spinal nerves, followed by paralysis or paresthesias, have not occurred in our group of patients; nor have we had infections of the meninges. We have seen no case of death from spinal anesthesia occur in a patient who was a good surgical risk. The three immediate spinal anesthesia deaths in our own cases might well be attributed to faulty selection of patients for spinal anesthesia. All these cases occurred early in our series and I am reasonably sure that not one of them would be selected now for spinal anesthesia. The general mortality from spinal anesthesia is unquestionably higher than that which is found in other anesthetics in common employment. It may be said that the selection of spinal anesthesia should depend upon whether the advantages of the best possible operative conditions counter-balance the increased risks incident to spinal anesthesia. The decision for its employment should rest upon the type of operation to be performed and the condition of the patient. Certainly spinal anesthesia carries with it some added hazard in any patient who is a questionable surgical risk. On the other hand, we feel sure that the use of spinal anesthesia has enabled us to satisfactorily carry certain patients through difficult surgical crises with success whose successful operation might have been questionable under any anesthetic producing faulty muscular relaxation. We feel that, even though there may be increased anesthetic mortality, its use has been fully justified by the life-saving results which we have been able to obtain in difficult and hazardous surgical procedures necessitating great muscular relaxation. With a better understanding of the operative complications and the syndrome of respiratory distress and cardio-vascular insufficiency resulting from spinal anesthesia, it is probable that many of the reported mortalities might be avoided at the present time.

We have observed a fall in blood pressure which is rather constant in all patients following spinal anesthesia. When this fall in blood pressure is slight, there result few clinical manifestations. In our own group of cases we have observed that, the higher the spinal block and the larger dose of spinal anesthesia employed, the more pronounced was the drop in blood pressure and the more alarming were the respiratory and cardiac complications. Seevers and Waters have explained the occurrence of these phenomena in a most satisfactory manner. Their conception of the fall in blood pressure and the respiratory embarrassment during the untreated high spinal block was:

The initial decrease in peripheral resistance to blood flow by a vaso-nerve and skeleton-muscle paralysis; a decrease in minute volume respiration accompanying intercostal-nerve paralysis; inadequate oxygenation of blood; diminished blood flow and progressive loss of vascular tone over the entire body with acute cardiac failure, both the result of oxygen starvation and failure of the respiratory mechanism as the nutrient flow of blood becomes inadequate, the latter occurring while the heart is capable of being revived by oxygenation.

These experimental conclusions have been clinically borne out by the response which is manifested in these patients with respiratory complications and cardio-vascular collapse by the judicious use of artificial respiration and the free use of undiluted oxygen. We have seen no case of cardio-vascular collapse which was not primarily associated with an alarmingly slow respiration. When artificial respiration has been established, and free use of oxygen employed, there has been clinically observed an immediate response in the cardio-vascular let-down. Sise reports two cases with

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CASE REPORTS

SPINAL ANESTHESIA
DEATHS ON TABLE

	Diagnosis	*Operation*	*Circumstances of Death*
(I) A. F. O., 50. White, Male.	Probable tumor of pyloric end of stomach.	Pantocain anesthesia. High midline incision. Abdomen explored. Tumor found to have arisen from lesser peritoneal cavity secondarily involving stomach.	Twenty minutes after anesthetic was given patient devoloped respiratory distress, which was manifested by slow shallow respiration and whispering voice sounds. Artificial respiration mechanically begun. The heart function slow and irregular. Condition improved and heart function became regular. Respiratory distress again became apparent with a complete respiratory paralysis. Artificial respiration was continued forty minutes, or until death ensued.
(II) N. B., 41. Black, female	Toxemia of pregnancy. Contracted pelvis. Myocardial disease. (Patient had been in labor 48 hours, she had two convulsions. Her convulsive seizures were not controlled by opiates and magnesium sulphate.)	.12 gms. neocaine anesthesia. Low midline incision.	Ten minutes after anesthetic was given patient suddenly developed respiratory distress, which was manifested by slow shallow respiration. Mechanical artificial respiration was begun and intravenous fluids started. No response to treatment. Patient died of respiratory paralysis.
(III) G. C. W., 65. White, male	Low intestinal obstruction for a period of seventy-two hours prior to operation.	Spinocain anesthesia. Mid-right rectus incision. (Distal 16" of ileum were resected because of gangrene.) Ileo-caecal anastomosis.	Forty minutes after anesthetic was given patient developed respiratory distress manifested by slow respiration, whispered voice sounds, cardiac incompetency. Mechanical artificial respiration employed without benefit.

SPINAL ANESTHESIA
VIOLENT RESPIRATORY INFECTION

	Diagnosis	*Operation*	*Circumstances of Death*
(IV) J. A. H., 50. White, male, Wt., 200 lbs. Ht., 5 ft. 4 in.	Large high incisional hernia. Myocardial disease. (Patient was retained in hospital one week preparatory to operation because of cold.)	.12 gms. neocaine anesthesia. Repair of incisional hernia 11-11-31, by Mayo-imbricated method.	Twenty-four hours after operation patient developed massive bilateral bronchial pneumonia and died on the third day.
(V) E. M. B., 40. White, female	Partial intestinal obstruction and peritoneal adhesions, post-operative.	.12 gms. neocaine anesthesia. Obstruction freed by incising peritoneal adhesions on 10-6-31.	Twenty-four hours after operation patient developed massive post-operative pulmonary atelectasis in left chest. Symptomatic treatment resulted in no improvement. Death occurred 10-8-31.

GENERAL ANESTHESIA
VIOLENT RESPIRATORY INFECTION

	Diagnosis	*Operation*	*Circumstances of Death*
(VI) W. E. R., 64. White, male	Hypertrophied and obstructive prostate.	Ethlyene anesthesia. Suprapubic prostatectomy on 6-28-34.	Twelve hours after operation patient developed acute respiratory distress, T. 104, P. 140. Physical examination showed massive bilateral bronchial congestion, which had the physical evidences of bronchial pneumonia. Died twenty-four hours after operation.

complete respiratory paralysis carried from twenty minutes to one-half hour with artificial respiration, or until the effects of the spinal block had worn off. Babcock reports three similar cases.

We have used ephredrine in prophylactic doses to maintain the original blood pressure. We have not used ephedrine in cases with persistent tachycardias before operation. It is not felt that ephedrine will do any harm to a heart muscle which has already been chosen to stand the strain of a spinal anesthesia. We have used a moderate Trendelenburg position during most operative procedures and, when circulatory disturbances have taken place, we have given intravenous fluids before the vessels and heart were in a state of collapse.

CHART I

Total General Anesthetics		1,541
*Total Spinal Anesthetics		1,415
		2,956
Mild Respiratory Infections		
General	20	1. 3%
Spinal	41	2. 9%
Violent Respiratory Infections		
General	6	0. 4%
Spinal	6	0. 4%
Respiratory Deaths		
General	1	0.06%
Spinal	2	0.14%
Deaths on Table		
General	0	0. 0%
Spinal	3	0. 2%
Deaths Attributable to Anesthetic		
General	1	0.06%
Spinal	5	0.35%
*Spinal Failures	25	
Percent of Spinal Failures		1. 8%

CHART II

Intra-Abdominal Operations:

	General	*Spinal*
Biliary Tract	24	120
Stomach	8	40
(Partial Gastrectomy)	(1)	(16)
Intestine	23	49
Appendix	283	407
Exploratory	16	21
Genito-urinary	1	2
Gynecological	164	361
Miscellaneous	7	13
	526	1,013

CHART III

Extra-Abdominal Operations:

	General	*Spinal*
Face and Head	44	0
Thyroid	125	0
Chest	4	3
Breast Amputations, Radical	22	0
Hernia	43	151
Genito-Urinary	79	53
Gynecological	263	69
Rectal	116	65
Amputations	27	17
Extremities	86	16
Miscellaneous	207	28
	1,015	402

CHART IV

	General		*Spinal*
Intra-Abdominal Operations	526		1,013
Mild Respiratory Infections	9	33	
Violent Respiratory Infections	4	5	
Respiratory Deaths	0	1	
Deaths on Table	0	3	
Deaths Attributable to Anesth.	0	4	
Extra-Abdominal Operations	1,015		402
Mild Respiratory Infections	11	7	
Violent Respiratory Infections	2	1	
Respiratory Deaths	1	1	
Deaths on Table	0	0	
Deaths Attributable to Anesth.	1	1	

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DISCUSSION

DR. I. A. BIGGER, Richmond: I would like to congratulate Dr. Emmett on his rational discussion of this important subject. It seems to me that my ideas so nearly agree with his on most phases of the subject that the main thing that I can do is to emphasize some of his statements.

My general impression is that spinal anesthesia is the anesthetic of choice only in operations where muscular relaxation is of primary importance. In the Surgical Department of the Medical College of Virginia Hospitals, we use spinal anesthesia in a large percentage of abdominal operations and we use it frequently in operations on the lower extremities. We almost never use it in operations above the diaphragm because the advantage of spinal anesthesia above the diaphragm is not sufficient to outweigh the increased danger.

It seems to me that a discussion of the indications and contra-indications of spinal anesthesia must necessarily include the question of dosage. In the upper abdomen 150 mg. of novocain is usually necessary to obtain anesthesia, whereas, in operations upon the lower extremities 50 mg. of novocain will usually suffice. The larger dosage is contraindicated in severe heart disease and hypertension, but 50-75 mg. carries little danger in either of these conditions.

As an indication of our estimate of the usefulness of spinal anesthesia, I would like to give some figures from our surgical service for the year 1933. There was a total of 4,887 operations of all types. In this group we used spinal anesthesia 977 times or in nearly 20%. I found, rather to my surprise, that we were using spinal anesthesia in approximately 80% of the abdominal operations. My impression is that we are not using spinal anesthesia as frequently as we were a year ago in upper abdominal cases, but we are using it more frequently in lower abdominal cases.

DR. HERBERT H. SCHOENFELD, Washington: May I ask the essayist one question—the incidence, if any, of a picture that could be ascribed to meningomyelitis. I have seen one case, following spinal anesthesia. We occasionally hear report of marked inflammatory reaction in the spinal meninges, and perhaps in the cord itself. Certainly this complication can be very distressing, if not permanently damaging in its effect.

DR. FRANK S. JOHNS Richmond: I have enjoyed Dr. Emmett's report and frank analysis of his cases.

In our private work we have had no calamities with spinal anesthesia, but we have had some embarrassment, especially with patients advanced in years and it has been necessary to do the operation under general anesthesia at a later period. We also had one case in the ward of another hospital who was operated on under spinal anesthesia by my associate, Dr. Daniel. This patient died a few days later of meningitis.

The use of general anesthesia properly given has been a great satisfaction to me and I believe an advantage to my patients. Dr. I. H. Goldman, my anesthetist, gives an ideal anesthetic from the patient's point of view. He usually gets an upper abdominal relaxation with nitrous-oxide-ethylene anesthesia plus fifteen per cent ether. Many upper abdominal cases of serious nature are relaxed sufficiently under nitrous-oxide-ethylene anesthesia alone.

I had the impression that spinal anesthesia was being used liberally on ward patients. I am pleased to hear, through Dr. Bigger, that this wave of enthusiasm has been slightly curbed.

DR. EMMETT, closing the discussion: I want to thank all the gentlemen who have discussed my paper. I do not think that I would have elected to have read a paper on spinal anesthesia had I realized that our complications from this anesthesia were going to be so apparent and impressive.

I have never been sufficiently enthusiastic about spinal anesthesia as to cause me to use it exclusively. I have found it very advantageous in my work and have had a feeling generally that the respiratory complications would be minimized after spinal anesthesia. A correlation of our studies does not confirm this opinion. We have had three outstanding deaths following the use of spinal anesthesia and I feel now that all of these deaths were due probably to the improper selection of cases for spinal block. They occurred in the early part of our series. A little more knowledge of the proper selection of cases and more knowledge of the methods of combating respiratory paralysis might well have avoided these fatalities.

Dr. Bigger, I think, mentioned a very important phase of this subject—that is, the question of dosage. In our early cases we used relatively large doses—from 120 to 150 mgms. for the average abdominal case. In our later cases we have found that we have been able to accomplish the maximum procedures with 100 mgms. Our own results and a careful analysis of the literature led me to believe that the smaller the dose and the lower the anesthesia, the less likelihood there was of a respiratory paralysis.

A material contribution in the question of spinal anesthesia has been given in the experimental work of Waters and Seevers. They have demonstrated that, although patients may have respiratory paralysis, if the proper method of artificial respiration is established early, before cardiac embarrassment has taken place, such patients may be carried through their period of spinal block without disaster. Sise, of the Lahey Clinic, has reported two cases successfully treated with artificial respiration and Babcock has reported three cases.

Dr. Schoenfeld asked the question concerning infections. Fortunately we have not had any infections of the meninges in our group of cases, although we have realized that eventually, if this type of anesthesia is continued to be employed, we will have infections.

Dr. Johns has been very fortunate in his experience with general anesthesia. Dr. Johns' good fortune might well be attributed to the fact that he has associated with him an anesthetist of the highest type who has given anesthesias for him for twenty years. Naturally Dr. John's anesthetist is more adept than those anesthetists who are available to the majority of us.

POLIOMYELITIS.

JAMES ASA SHIELD, M. D.,
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The incidence of poliomyelitis in our midst makes a review of this disease timely. Experimental poliomyelitis is entirely neurotropic. The virus travels along the olfactory nerve fibers to the central nervous system and it is propagated along the nerve tracts. The spinal fluid or blood does not seem to play a part.

The transmission of polio and its occurrence during the warm part of the year are indeed puzzling. We speak of the disease being caused by a virus. It is remarkable that a person with polio so rarely gives it to those around him. It is suggested that polio is carried by persons who have the disease in such mild forms they do not know they are sick. In an epidemic it seems to be that those who have natural immunity do not have the disease. Adults more frequently have a natural immunity; newborn babies seem to have a natural immunity. In an epidemic it seems that the number of cases depends, to a large extent, on whether or not the community has any natural immunity. It is the hope of medicine that we shall be able to give artificial immunity. Again we see epidemics recurring in the same locations. It is very likely that many people have polio and do not know it. It is also quite probable that during times of epidemic many people are diagnosed as having abortive types of polio that never have it.

The incubation period is eight to fourteen days or shorter; no symptoms. The prodromal stage, one to three days, is characterized by headache, vomiting, diarrhoea or constipation, fever, slight pharyngitis, restlessness at night and sleepiness during the day. (Cases are observed which began at once with paralysis.) If the process continues, it localizes in the central nervous system to produce the second, or pre-paralytic, stage. There may be an interval of one to four days or more between these stages and then fever, headache and gastro-intestinal symptoms start again along with symptoms of meningism and possibly symptoms of motor irritation (changes in reflexes) and in the following three to six days paralysis sets in with differences in the reflexes, decrease or disappearance of the ankle, knee and abdominal reflexes, fibrillary jerks, tremors, abnormal sensitiveness to pressure in single extremities, and pains when the head is bent forward or when the vertebral column is bent backward. This stage is followed quickly by paralysis. The spinal fluid should always be taken for diagnosis as well as therapeutically. The fluid will be clear or murky and under increased pressure which should be reduced to normal. The examination of the fluid will reveal 5-100 cells, or more, and increased globulin. The above picture with this fluid finding is diagnostic.

The paralysis is most frequently in the legs, then the arms and occasionally the cranial nerves are involved. Disturbance of the bladder and rectum is rare.

Successful therapeutic claims have been made for treatment in the early stages. There are many abortive cases that never pass the early stages, so it is absolutely impossible to assay any such treatment. Complete rest is of greatest importance during the acute stage with particular attention given to keep the extremities and body in proper position. Lumbar puncture seems to be universally accepted. It is felt that the fluid should be kept down to a normal pressure by spinal fluid drainages, at first every day and then every few days until inflammatory edema in the spinal cord and in the meninges

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has disappeared. Intravenous injections of hypertonic solutions have the same rationale. Hypotonic solution with continuous drainage has been suggested as a means of cutting down the cell count. This has been questioned. Pooled convalescent and normal adult serum has been disappointing. Blood transfusions have been used and parents' blood, intramuscularly injected, but neither of these has been of any proven volue. Drugs are of no curative value. Vaccine (P-B and K) is for prevention (if proved to be of any value). If spinal symptoms are present, put a board between the mattress and springs under the lumbar and dorsal portions of the spine. A pillow under the back will add to the comfort for in lordosis the spinal cord is relaxed. The outward rotation of the legs is combated by sand sacks. It is very important to brace the feet with a stool pressed to the soles. The comfort of the patient is added to by protecting them from the pressure of the bedclothes by means of hoops. When the fever is over we should start with cautious, passive movements of the paralyzed extremities which are gradually increased. Partial baths, as warm as possible, or warm compresses and kneeding massage, modified carefully to the sensitiveness to pain, further the recovery of the muscles. The massages can usually be started after the second week. Faradic current is used after the third week. As convalescence proceeds active exercise should be begun, at first in a warm bath, and above all, with great care that the patient does not become overtired. Mechanical and electrical exercise treatment should be continued for months and it not infrequently brings results. If severe muscular dystrophies develop we should have an orthopedic consultation as the patient can often be greatly helped by small splints or supporting apparatus.

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TOTAL THYROIDECTOMY FOR CHRONIC HEART FAILURE.*

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Harvey, in 1628, discovered and demonstrated that the blood traveled in a circuit. He estimated that the minute volume output of the heart was 400 c.c., but made no calculation as to the velocity flow. Stephen Hales, in 1733, made the first quantitative estimations of the blood flow. From his experiments he concluded that the velocity of blood flow in the aorta of the horse was 1,734.9 feet per hour and in man 8,952 feet per hour. The injection method was first used by Herring in 1827 when he injected potassium ferrocyanide. Stewart, in 1892, used sodium chloride injections and noted the change in electrical conductivity of the blood vessels at various areas. These experiments and those of Koch in 1922, which were on normal and abnormal subjects, most likely inspired the Boston investigators, particularly Blumgart, Yens and Weiss, to conduct their extensive researches which have been continuous to the present day.

They have correlated the value of the velocity of blood flow to the basal metabolic needs of the body. In their experiments on normal and abnormal subjects they found that the velocity of blood flow was definitely determined by the metabolic demands of the body and that the metabolic demands were most accurately determined by the metabolic rate. They state: "An adequate flow of blood to the tissues implies two things. In the first place, an adequate amount of blood must be expelled from the heart per unit of time. In the second place, this blood must be transported to the site of utilization at an adequate speed." In normal subjects the amount of blood and the velocity flow meet these requirements.

In thyrotoxicosis without decompensation the minute volume output and the speed of the blood are increased in close proportion to the increased metabolic rate. A heart under these conditions with the body at rest is doing the work of a normal heart with the body at work. This excessive load causes a disproportionate relationship between the minute

*Read before the sixty-fifth annual meeting of the Medical Society of Virginia, at Alexandria, Va., October 9-11, 1934.

volume output, velocity flow and metabolic demands ending in decompensation.

In myxedema the minute volume output and the speed of the blood are decreased in a close relationship to the decrease in the metabolic rate. If two curves are plotted in a myxedematous patient, one to show the velocity of blood flow, the other the basal metabolic rate, and thyroid extract is given, the two curves will practically parallel each other. When the thyroid extract is discontinued, the two curves will fall to their original level in a parallel manner. The blood flow in myxedematous patients without heart disease is almost as slow as that of patients with circulatory decompensation from rheumatic valvular heart disease and auricular fibrillation. The fact that the myxedematous patients without heart disease show no signs of decompensation in spite of the slow velocity flow demonstrates, so far as supply and demand are concerned, the importance of the metabolic demands of the body.

In angina pectoris the patient at rest seldom has pain. This is due to the adequate blood supply. Pain in angina of effort will be produced in the same subject by doing the same amount of work in an astonishingly close range. During exercise greater demands are made of the circulation and due to the narrowing or spasm of the coronary vessels a proper amount of blood is not furnished the heart and pain ensues. Anginal attacks are produced by all agents which tend to increase the work of the heart and are alleviated by those which decrease it.

In circulatory insufficiency of a mild degree with a normal metabolic rate the blood flow is markedly decreased. As the decompensation advances in spite of a metabolic rate within normal limits, the slowing of the velocity of blood flow parallels to a close degree the severity of the congestive failure.

In a study of these four cardiac conditions, it is evident that circulatory insufficiency consists of the heart being unable to supply and maintain a minute volume output of blood at a sufficient velocity to meet the basal metabolic needs of the body. Theoretically the need of the body equals the blood flow. Therefore, if the blood flow cannot be increased to meet the demands of the tissue, the demands of the tissue should be decreased to conform with the blood flow. This may be done by total removal of the thyroid gland.

The arm to tongue circulation time is generally used as the index of the velocity of blood flow. This time is measured by injecting from 3 to 5 c.c. of a 2 per cent solution of decholin into an anticubital vein and when a bitter taste is experienced by the patient it is recorded as the circulating time. Various figures for many normal and pathological states are available. The following are about the general average for the arm to tongue circulating time: Normal subjects, from ten to sixteen seconds; hyperthyroidism six to twelve seconds; anemia nine to fifteen seconds; polycythemia sixteen to eighteen seconds; myxedema twenty to thirty seconds; congestive heart failure twenty to forty-seven seconds.

The symptoms of congestive failure of long standing are usually markedly improved after total thyroidectomy. Most of the patients state in a few days to two weeks after the operation that a "heavy load has been lifted from their chest" and that the pounding of the heart had disappeared and moving about in bed did not cause distress. Breathing a few days after operation is much easier and by the end of the second or third week those with dyspnea and orthopnea can lie flat in bed without discomfort and usually can sleep without sedatives. The pre-operative craving for water disappears.

The signs of congestive failure are greatly modified after operation. The natural color of the skin returns, the rales at the base of the lungs disappear, the liver congestion and tenderness are greatly lessened or disappear, and the edema with slight dependency is diminished or remains absent. The pulse rate is markedly slowed, the heart sounds become less intense and the cardiac impulse less hyperactive. The dose of digitalis to control auricular fibrillation is decreased, the erythrocytes are generally reduced, and hemoptysis lessens as compensation appears. The blood pressure is seldom altered. The electrocardiographic changes are varied as in myxedema. Premature contractions disappear in many patients. The vital capacity of the lungs is increased in many but not in all; however, their improvement is as great. This is probably due to the fact that in myxedema the vital capacity is abnormally low. The velocity of blood flow remains slow in contra-distinction to the usual improvement that follows congestive failure with an unaltered metabolic rate. In the latter case improvement always follows an increase in velocity flow of blood. Tolerance to exercise is markedly improved. Some

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of the Boston cases were only able to make from three to ten trips over a few steps before operation and after operation one case made 419 trips without any of the previous symptoms of cardiac embarrassment.

In angina pectoris the relief from pain is interesting. In most cases there is relief from pain soon after the operation. This pain may recur, again disappearing later. If a hemithyroidectomy is done, there is relief from pain on the side of the operation. If the pain is reproduced, it will appear only on the non-operated side. Later, it may appear on both sides, finally to disappear when the basal metabolism rate is sufficiently lowered. If a bilateral ablation is done and the basal metabolic rate is markedly lowered, pain will not occur.

Zondek, in 1918, first described the myxedematous heart and many articles on that subject have appeared since that time. In a review of the literature it appears that probably more hearts have suffered from thyroid extract than have ever been improved. The signs and symptoms that follow the total removal of the thyroid gland are slowing of the heart rate, slight dryness of the skin, increased sensitiveness to cold and a slower growth of hair. Mental stupor, depression and nervousness are not seen until the basal metabolic rate is below minus 30, and then thyroid extract is indicated. After operation, instead of the myxedema producing unpleasant symptoms, the symptoms are markedly improved. This is partly due to the distressing symptoms suffered before from circulatory failure. If compensation is restored and maintained in a large majority of hopeless cardiac patients, should the question of a myxedematous heart be an issue?

The indications for such a radical procedure are few. However, in selected cases of circulatory failure and angina pectoris, where the patient is completely incapacitated and all other treatment has failed, the operation may add months to years of active life.

The contra-indications are a rapidly progressive cardiac lesion, syphilitic heart disease, congestive failure with edema at the time of operation, active pulmonary infarctions, advanced arteriosclerosis, active rheumatic infection, or an active phase of coronary thrombosis or impaired renal function, and when the basal metabolic rate is minus 10 to minus 15, as well as when, after a careful study, the patient does not seem to be a fair surgical risk.

Dr. H. L. Blumgart has kindly sent me tables showing the condition of all patients he and his associates have treated by total thyroidectomy up to June 1, 1934. Of fifty patients with circulatory failure treated, twenty-four have compensation maintenance two to eighteen months and patients are working or able to work. There were six operative deaths, six patients with recurrent temporary decompensation, six subsequent deaths, two patients unimproved and six too recently operated upon to report results. There were also twenty-five patients with angina pectoris from whom the whole thyroid gland was removed, with complete relief in eight cases, partial relief in eleven, no relief in four, no operative deaths, and two too recently operated upon to justify a report. In the last thirty consecutive operations on these seventy-five patients there were no deaths.

The following is the report of a case of arteriosclerotic heart disease with aortic insufficiency, marked hypertrophy, hypertension, cardiac asthma and chronic congestive failure:

Mr. W. H. W., age 52 years, was admitted to St. Elizabeth's Hospital, Richmond, Va., March 16, 1934. He complained of congestion of his lungs, palpitation of the heart, shortness of breath, a constant pressure on his chest, pain in the upper right abdomen, and inconstant nausea.

History: Father died at the age of 50 years, mother at the age of 60 years, and one sister died of heart and Bright's disease. The past history was negative except for diphtheria at the age of 4 years. His health was excellent until eight years ago when he first noticed slight dyspnea. His height was 5 feet and 5½ inches, and he weighed 177 pounds. For the next two years he assumed that his weight was the cause of the dyspnea, but an examination about that time showed an excessive blood pressure with signs of myocardial weakness. There were some stomach complaints and X-ray examination showed gall-bladder pathology. The treatment for the next six years was directed toward his hypertension and indigestion. The symptoms of heart failure progressively continued until twelve months before admission to the hospital when they had become so severe that life was miserable. The palpitation, dyspnea, pressure on his chest, and gastrointestinal symptoms were constant. Cardiac asthma and congestive failure occurred with greater frequency and with less and less

exertion. For three months prior to admission, one or two days a week out of bed would cause congestive failure of distressing severity.

Physical Findings: The patient was poorly nourished, of a sallow complexion, with visual evidence of an enlarged heart, and pulsating vessels in his neck. The gums were infected, lungs were congested in the bases, and the liver was enlarged three fingers and was quite tender. The heart was markedly enlarged, with a loud systolic murmur and a diastolic murmur with many extra systoles; the blood pressure was 250/130. There was slight edema of the ankles.

Laboratory Findings: Erythrocytes 3,988,000; W. B. C. 8,260; hemoglobin 65 per cent. Phenolsulphonephthalein output 45 per cent the first hour and 14 per cent the second hour. Blood urea 40 mg. per 100 c.c. of blood. Van den Bergh 8.6 mg., direct reaction. Blood calcium 8.2 mg. The urine showed specific gravity of 1.025, a distinct trace of albumin, slight trace of bile, rare granular and hyaline casts. Two basal metabolism tests showed a rate of plus 43 and plus 41, but the tests were unsatisfactory on account of dyspnea.

After careful study of the patient and considering the long cardiac history and the fact that the patient had been treated by a competent internist for over a year during which time his cardiac failure had been slowly progressive, total removal of the thyroid gland was thought to be indicated and the patient expressed the desire to have this done, since he said life had not been worth living for the past few months. On March 19, 1934, Dr. J. Shelton Horsley completely removed the patient's thyroid gland, under ethylene anesthesia. For twenty-four hours there was smooth convalescence, with only a slight rise in temperature and pulse rate. The following day auricular fibrillation and a pulmonary infarction occurred, followed later in the day by a kidney infarction. After these complications subsided, the convalescence was satisfactory after the fourth day. On account of the previous digestive disturbances and the X-ray finding of gall-bladder pathology, and an attack of pain in the right upper abdomen on the ninth day after the total thyroidectomy, a cholecystectomy was done, under local anesthesia, on the fifteenth post-operative day. Following this, the patient's temperature on the day of the cholecystectomy was 99.8° and on the second day it was 100°, after which time it did not go above normal. Seven days after ablation of the thyroid the basal metabolism was 0 and later minus 19, which was the lowest rate recorded, but no metabolism tests were done during the best periods of compensation.

He remained in the hospital for forty days. During the last seven days he was up and walking about without any shortness of breath or palpitation. When asked how he felt, he said, "A great load has been lifted from my chest and the pounding has disappeared." He returned home much improved and apparently compensated. He started a new business, but was forced to give it up on account of the amount of work it required. One month after leaving the hospital he was much improved and well satisfied with the results. There were few of the signs and symptoms of myxedema. In another month he returned with an ascites which was removed by paracentesis. Since then he has been on a cardiac regime with diuretics. There has been no return of the cardiac asthma nor any of the other distressing symptoms. On October 1st he returned for examination as requested. One morning before coming to the hospital he walked sixteen blocks without fatigue. When asked how he felt, he said "I feel fine except that it's hard to keep warm these cold days, and my abdomen stays too large." The results have been most satisfactory in relieving the cardiac distress, but the ascites continues to be troublesome.

NOTE BY DR. J. SHELTON HORSLEY

The indications for total thyroidectomy for heart disease must necessarily be determined by the careful study of a medical man. In such cases the surgeon has to do only with the operative technic. As has been emphasized by Berlin and by others who have done total thyroidectomies, this operation is much more difficult and tedious than partial thyroidectomy, though experience in thyroid surgery is helpful. The important points are the avoidance of injury to the recurrent laryngeal nerves and protection of the parathyroid glands. The operation which I did in this case reported by Dr. Chapman followed the general lines of the technic recommended by Dr. Berlin. A wide incision was made low in the neck, the ribbon muscles were doubly clamped and divided, and the whole thyroid gland was dissected out from right to left, with careful hemostasis and sharp dissection throughout. The

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capsule of the gland was closely followed and no particle of thyroid was left. The operation was done under ethylene anesthesia and lasted one hour and fifty minutes.

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DISCUSSION

DR. KINLOCH NELSON, Richmond: I enjoyed Dr. Chapman's paper very much and think he has brought up a subject which all of us will have to consider from time to time.

About two weeks ago we recommended this operation to a man who had been incapacitated for two years by cardiac failure on the basis of arteriosclerotic heart disease with hypertension. He and his family refused. Yesterday, at home, he again presented the picture of overwhelming decompensation, although he had been in fairly good condition after some time in the hospital. The point is that in this case no procedure could have gotten a worse result than that which followed ordinary measures, as death is obviously imminent. Any treatment, operative or otherwise, which might offer relief, even if only symptomatic, appeared advisable.

In the Medical College of Virginia hospitals three patients from the service of Dr. W. B. Porter have had this operation performed by Dr. I. A. Bigger. A brief summary of these cases will show some of the questions which arise.

Case I.—W. V., a colored male, giving his age as 38, was seen in August, 1933, with mild cardiac failure on the basis of arteriosclerotic heart disease with hypertension and auricular fibrillation. The blood Wassermann was positive. His clinical appearance suggested hyperthyroidism. After a short stay he improved considerably and was discharged.

Three months later, November, 1933, he returned in extreme decompensation. Wassermann was positive. Basal metabolic rates were plus 55, plus 30, and plus 32. He was given Lugol's solution for twenty-three days. Improvement was marked. Basal metabolic rates were minus 3 and plus 20. After thirty-eight days in the hospital he was discharged in December, 1933.

Two months later, February, 1934, he again returned with marked heart failure. After three weeks in the hospital there was considerable improvement. Basal metabolic rates were plus 22 and plus 8. Lugol's solution was not given on this admission. On March 10, 1934, total thyroidectomy was done. Pathological report: Diffuse non-hyperplastic goiter. His post-operative course was complicated by pulmonary involvement thought to be bronchopneumonia. Recovery from this was gradual and he left the hospital April 4, 1934, twenty-five days after operation, in good condition.

Two weeks ago, that is seven months after operation, he was well and going about as usual.

In this case certain questions which naturally arise make the evaluation of the relief apparently afforded by this operation quite difficult. It is possible that hyperthyroidism was the fundamental dysfunction which resulted in the repeated cardiac failure, and as thyroidectomy in such cases has long been known to improve or "cure" the cardiac failure, presentation of this case may not seem germane to the subject. This point is not settled by the elevated basal metabolic rate, well-known to occur in cardiac failure, where the determination is made by the customary indirect method. Whatever the primary difficulty, this man seems to have been greatly helped by the operation.

Case II.—F. M., 58-year-old white man, was first admitted in March, 1934, suffering from mild cardiac failure with attacks of lower substernal pain and dyspnea, especially nocturnal dyspnea, of three or four months' duration. Several of the more severe attacks of substernal pain had been accompanied by rather marked elevations in temperature. After two weeks of medical treatment he left the hospital somewhat improved.

Two months later, May, 1934, he returned with his condition unchanged, except that the substernal pain had

been less troublesome. Had been confined to bed and the chair in his room. He remained in the hospital one week without improvement.

Three months later, August, 1934, he again entered the hospital. No appreciable difference in his condition was noted. Dyspnea, orthopnea, and nocturnal dyspnea were marked. Basal metabolic rates were plus 7 and minus 2. After two weeks in bed on medical treatment there was no improvement. On September 3, 1934, after ten to eleven months of continuous medically treated, yet unimproved, cardiac failure with the diagnosis of arteriosclerotic heart disease, total thyroidectomy was done. Pathological report: Parenchymatous goiter. There was a post-operative lung complication from which he gradually improved and left the hospital on September 15th. The basal metabolic rate was minus 18. Symptomatic improvement was striking, especially with regard to the dyspnea and orthopnea. He was able to sleep flat in bed all night, something he had not done in many months.

On September 24, 1934, three weeks after operation, he returned with acute cardiac failure and chest pain, the whole picture strongly suggesting coronary thrombosis. Since that time he has gradually improved and now seems fairly well. Symptomatically, he is better than he has been at any time during the six months prior to operation. Basal metabolic rate is now minus 31. Ascites, previously marked, has begun to return.

In this case the operation seems to have had little effect on the progress of the disease. Relief of symptoms has been marked. The patient himself is well pleased with the procedure. Enough time has not elapsed to evaluate properly the real result.

Case III.—C. T., colored male, giving his age as 47, entered the hospital on September 1, 1934, in advanced cardiac failure. There had been several similar previous attacks in which compensation had returned after long periods of rest and medical treatment. His case was diagnosed arteriosclerotic heart disease with moderate hypertension and auricular fibrillation. After twenty-five days in the hospital on rest, sedatives, digitalis, and diuretics, there was no particular change in his condition. Basal metabolic rate was minus 4. Total thyroidectomy was done on September 26, 1934. Pathological report: Normal thyroid. In the short time since operation there has been slight symptomatic improvement. Ascites, which required aspiration on several occasions pre-operatively, has continued to reaccumulate. Sufficient time has not elapsed to judge the results adequately.

In conclusion, I believe all of us appreciate the seriousness of such a procedure in such patients. Yet, in these cases, we are dealing with hopeless invalids whose practically constant discomfort is not alleviated by any known adjustment of the customary well-tried remedies. Even temporary symptomatic relief, such as that obtained in Case II, may be worth while, and in my opinion should be offered to the patient.

It seems almost banal to reiterate that this relatively drastic measure should be reserved for those cases in which careful application of well-known and well-tried remedies have proven ineffectual.

I am very grateful to Dr. Chapman for allowing me this opportunity to take part in the discussion.

DR. WILLIAM B. PORTER, Richmond: The use of ablation of the thyroid gland in the treatment of heart failure, either of the congestive type or heart failure with pain, is so new that one hesitates to predict its future or to recommend it as a procedure of merit without reservation. It is true that the report by Dr. Blumgart and our own experience with the procedure create a certain amount of cheerful optimism.

The operation is designed primarily not to cure heart disease, but rather to adjust the patient by reduction of the metabolic rate to his handicap. As I said this morning, a patient with heart disease who is overweight, may be adjusted to his existing physical handicap by a reduction of weight. This is merely an adjustment of the patient to his physical defect.

Dr. Nelson, in his discussion, overlooked one of our most important patients, for this man was able to resume physical work and has remained out of the hospital for a period of one year, carrying on actively. Previously, he had been in a state of irreducible heart failure for a period of four months.

The introduction of this therapeutic method places a serious responsibility upon the practicing physician, for the choice of patients suitable for operation is a very difficult decision. In the first place, one must differentiate between an inadequately treated patient and irreducible heart failure. We have found that many patients recommend for thyroidectomy improved decidedly on the wards under routine hospital care. In the selection of patients with coronary disease for this procedure, one must reckon with the aspect of arteriosclerosis on the one hand and the result of thyroidectomy on the other. We know that patients with coronary disease, as a rule, die because of insufficiency of coronary circulation and that this in turn is induced by arteriosclerosis of the coronary vessels. Recent work on arteriosclerosis indicates that it is definitely concerned with cholesterol metabolism. Myxedema is characterized by marked increase in blood cholesterol and there is a marked slowing of blood flow with reduction in total metabolism. It is highly probable, therefore, that we may predispose these individuals to the development of the most serious complication of coronary disease, namely, coronary occlusion.

The procedure is too serious in its implications for us to become unduly enthusiastic. For the time being, it must remain in the hands of those physicians particularly skilled in cardiovascular disease, and the operative procedure must be done by surgeons experienced in thyroid surgery.

DR. EDMUND HORGAN, Washington, D. C.: The presentation of this case by Dr. Chapman and the discussion by Dr. Nelson make us realize that the surgeon must have a good knowledge of physiology as well as pathol-

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ogy if he is going to co-operate with the cardiologist in the treatment of such diseases as angina pectoris and congestive heart failure. In doing a total thyroidectomy there is a likelihood of producing damaging effects as a result of removing the thyroid and parathyroids and as a result of operative trauma. These damaging effects are myxedema, disturbance of the calcium metabolism and, in some instances, paralysis of the recurrent laryngeal nerve.

About twelve years ago I observed that in cases of recurrent and persistent hyperthyroidism that there was a thrill and bruit of the thyroid arteries even in the cases which had had thyroidectomy performed. I came to the conclusion that all of the thyroid vessels should be ligated in doing a thyroidectomy and this practice I have carried out for a number of years. Recently, in going over a group of cases of hyperthyroidism which have been operated upon from five to ten years, we found that the patients had not only been relieved of hyperthyroidism but that they had also been relieved of the cardiac condition associated with it. It was also noted that the cases which had been considered recurrent or persistent hyperthyroidism and had been re-operated upon and had had all of the blood vessels divided and ligated that they also had been relieved of the hyperthyroidism. As a result of this study we got the idea that if thyroidectomy and ligation of the superior and inferior thyroid arteries, in case of hyperthyroidism, would bring about such a noticeable improvement of the condition of the heart that we could also improve the condition of the patient in certain cases of heart disease and angina pectoris if we ligated the superior and inferior thyroid arteries.

Consequently we looked about for a case. On December 19, 1933, I operated upon our first case and since then we have operated upon five others. The operative procedure is as follows: The thyroid gland is exposed and all the vessels at each superior pole are exposed, ligated and divided. We then ligate and divide the inferior thyroid artery on each side. If the inferior thyroid artery has branched before it reaches the gland we ligate all of the branches. Then all of the vessels at the inferior poles are ligated and divided so as to be sure of cutting the thyroidea ima artery.

The question which naturally arises is this: what are we actually doing and what do we hope to accomplish by such an operation? We are separating or dissociating the thyroid from the sympathetic nervous system and we are cutting down the blood supply to the thyroid gland. We are doing an operation which does not produce any immediate or late damaging effects upon the patient. We are accomplishing this: First, stimulation of the thyroid gland is prevented by cutting the sympathetic nerves to the thyroid; second, the normal interrelationship of the innervation of the heart and the thyroid is interrupted; third, sensory fibers of the sympathetic nervous system to the heart are cut; fourth, the normal blood supply of the thyroid is markedly reduced by dividing and ligating the vessels; fifth, the circulatory demands are lessened; and, sixth, the work of the heart is lightened.

In conclusion, I should like to say that we must not think that every case of angina pectoris or congestive heart failure can be relieved by total thyroidectomy or dissociation of the thyroid from the sympathetic nervous system. We have to be careful in the selection of cases. Only patients who are strong enough to go through an operation should be accepted by the surgeon. After operation, it is most important that the patient be kept under close observation.

DR. J. MORRISON HUTCHESON, Richmond: I wish to emphasize, in a very few words, one point brought out in the discussion of this subject, and that is that any operation upon the normal thyroid for the relief of cardiac pain or of congestive heart failure is to be regarded as a clinical experiment and not as an established mode of treatment. Whatever its possibilities may be, we have not yet sufficient data to guide us in the selection of cases or in any sort of conclusion as to what this treatment is worth.

DR. JAMES A. LYON, Washington, D. C.: I appreciate this opportunity of listening to Dr. Chapman's very able paper and to Dr. Nelson's discussion of the case. As Dr. Horgan has stated, we have operated upon six patients during the past years. Five had angina pectoris. One of the patients with angina pectoris had anginal failure previous to operation. For two weeks, even with absolute rest in bed, he continued to have attacks. After a months rest in bed, he was not able to get up and move about without great pain. On December 29, 1933, Dr. Horgan dissociated the thyroid from the sympathetic nervous system and reduced the blood supply to the thyroid. Six days following the operation the patient had an attack of precordial pain. Since then, over a period of ten months, he has had no attack of substernal pain and no heart consciousness. He is able to work in his garden, to go up and down stairs, and to walk some fifteen blocks from his home to my office without discomfort.

The second patient, a renovator, aged 38, had been hospitalized on four occasions during the six months from October, 1933, to March, 1934, because of congestive heart failure. He has chronic arterial hypertension, aortic regurgitation and stenosis and cardiac hypertrophy. During his last period of hospitalization he had typical attacks of angina pectoris. He was operated upon May 4, 1934. Since that time he has had no further substernal pain nor recurrence of his congestive heart failure. But he is dyspneic upon exertion and has occasional nocturnal attacks of cardiac asthma.

Our third patient, a window dresser and salesman, aged 28, has been under observation for two years. Whenever he walked rapidly for a block or two or became excited, his heart beat fast and forcefully and he became short of breath. During his childhood he had two attacks of acute rheumatic heart disease. He has aortic regurgitation and stenosis, mitral regurgitation

and stenosis, and arterial hypertension. He was operated upon July 25, 1934. Since the operation he has had no further heart consciousness. He is now able to work regularly for eight to ten hours daily. The attacks of paroxysmal tachycardia are much less frequent and less prolonged. The forceful pulsations of the left ventricle and carotids have been lessened. The patient rests well during the night, can sleep lying flat in bed, and is not disturbed by the beating of his heart. Because of the valvular defects, this improvement may not be permanently maintained.

The fourth patient, a taxi driver, aged 44, had for a year been having attacks of substernal pain following exercise and over-eating. During a two-weeks' period of hospitalization in June, 1934, he had repeated attacks of angina pectoris. After his discharge from the hospital, unimproved, he remained in bed at home, but the anginal attacks continued to recur. On August 1st, the Wassermann and Kahn tests of the blood were plus 3. On August 6th, Dr. Horgan operated. Since the operation the patient has had no recurrence of the anginal pain. His exercise tolerance is satisfactory, and he has resumed his former occupation. Treatment for syphilis was not instituted until six weeks after his operation.

Two other patients, a woman, aged 73, and a drug-store proprietor, aged 60, have been operated upon within the last two weeks. Both have had a rapid convalescence and both have been relieved of anginal attacks of long standing.

Dissociation of the thyroid from the sympathetic nervous system and reduction of the blood supply to the thyroid is a much simpler operation than is total ablation of the gland. It has, with us, accomplished beneficial results without subjecting the patient to the possibility of myxedema.

DR. CHAPMAN, closing the discussion: I certainly agree with those who have discussed the paper that total ablation of the thyroid gland is a very radical procedure and still in the experimental stage. Sufficient scientific study has been done, however, to justify this operation in a few selected cardiacs. The improvement in the cardiac symptoms of the case reported, I believe, justified the operation. Our studies since then have failed to reveal the cause of the edema.

Dr. Lyon reports cases of angina pectoris in which ligation of the large vessels to the thyroid gland have given as satisfactory results as those cases of angina pectoris who have had total ablation of the thyroid gland. This relief, if temporary, could be easily explained, but the permanent relief is contrary to the work of the Boston group.

THE BASIS FOR OR AGAINST THE USE OF DIGITALIS IN CERTAIN DISTURBANCES.

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In 1785, William Withering[36] wrote of digitalis: "So far as the removal of the water would contribute to cure the patient, so far may be expected of this medicine." Forced to rely solely on his clinical observations, it is not surprising that Withering failed to understand the basic action of the drug and looked upon it chiefly as a diuretic—an error that led him sometimes to employ it in conditions where no benefit could be secured, as is evident from his statement that it failed in cases of "encysted dropsy." Since Withering's time, much has been learned of the action of digitalis, both through animal experimentation and bed-side observation, but it is discouraging to realize that today, almost a century and a half after the appearance of Withering's classical monograph, the use of the drug in some cases is directed largely or entirely by empiricism. Are we making errors similar to that of Withering when he administered digitalis to patients with "encysted dropsy," where good cannot be accomplished by it; even more serious, are we using it in conditions where its effects are actually detrimental? On the one hand, it is desirable to avoid useless or harmful medication with digitalis; however, when numerous and dependable clinical observations clearly indicate a beneficial effect, use of the drug should not be refrained from merely because we cannot explain fully how these effects are brought about.

According to Lewis,[20] at least 70 per cent of cases of congestive failure are accompanied by auricular fibrillation; it is here that the most striking results are obtainable by intelligent administration of digitalis. The action of the drug is, in all likelihood, twofold. In the first place, through depressing conductivity it reduces the number of impulses from auricles to ventricles and allows the latter to relax more fully and also to enjoy a longer rest period for recuperation. In addition, there is good rea-

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son to believe that the direct muscular action is also of importance; certainly the tonicity of the muscle is increased and, most probably, contractility, too, is favorably influenced,[10-29] so that there is an increased force and extent of the systolic excursions.

It has, apparently, been quite conclusively established that in these patients with heart failure digitalis leads to an increase in the cardiac output,[8-12] although it has been erroneously inferred from experiments on normal, unanesthetized dogs[16] and patients without cardiac failure[4] that the reverse was true.

Administered in proper dose to patients with auricular fibrillation and cardiac failure, digitalis may, then, be expected in most instances to bring about favorable, even brilliant results, results which are explainable and to be expected on the basis of our knowledge of the physiological actions of the drug.

A point which still is overlooked far too often is regarding the advisability of continuing the administration of "maintenance" doses of digitalis in the fibrillating patients after relief from pressing symptoms has been afforded by thorough digitalization. As aptly put by White, ". . . the lives of cardiac patients are often prolonged for years, while activity, and even highly remunerative work, may be maintained with few breaks for years through the simple, intelligent, and constant use of digitalis."[35] As clearly brought out by Gold,[14] there is no set quantity of the drug to be used in every case; the amount necessary must be determined by observing the reaction in each individual, but, as a rule, it is from one to two 0.1 gram tablets (one to two cat units) daily.

As recently as 1925, no less an authority than Cushny[10] wrote: "In hearts which present no anomalies in rhythm, but which are unequal to carry on a sufficient circulation, the effects of digitalis are still a matter of question." He condemns, however, the "exaggerated statement" that the drug was of value only in auricular fibrillation. Of recent years, Christian[5-6] has strongly advocated the use of digitalis in non-fibrillating heart failure; Wenckebach,[34] likewise, believes that administration of this drug is indicated in heart failure, regardless of its etiology.

Beckman[1] maintains that the results from digitalis administration in non-fibrillating heart failure may be no less striking than when fibrillation is present, an opinion that is shared by Marvin[22] and by Luten.[21]

If we accept that digitalis administration is beneficial in congestive failure not associated with auricular fibrillation, we come to the next question, namely: How does it bring about this benefit? Slowing of the rate, with increased diastolic filling and a longer rest period for the muscle may be a factor in some of the cases; in others, however, the drug has no influence on rate and yet improvement seems to occur. The assumption of a stimulant action on the muscle, "a whipping up," as it were, seems scarcely compatible with prolonged improvement, unless this temporary stimulation restores a disturbed balance of some sort. The influence of the drug on tonicity, through which there is a shortening of the muscle and reduced dilatation and greater functional efficiency may play an important role in bringing about improvement.

Of especial importance is Christian's advocacy of digitalis administration in "chronic non-valvular heart disease."[5-6] It is pointed out that rheumatic heart disease starts early in life and that a fatal termination is to be expected within twenty years of the first signs of cardiac involvement; syphilis, too, is "an incident in the bloom of life," and when syphilitic aortitis has advanced to the stage of causing symptoms, life-expectancy is reduced to five years. There is, because of these factors, a rapidly falling curve for the incidence of rheumatic heart disease in patients over thirty years of age and of syphilitic aortitis in those over forty; in spite of this, "After the forty year level, hospitals have usually an increasing rather than a decreasing rate of admissions for cardiac disease."

A striking feature of the cardiac involvement in many of these patients over forty is the absence of pronounced structural change in the heart muscle as revealed at post-mortem; indeed, the figures of Fitzhugh[13] indicate that gross or microscopic myocardial involvement is encountered scarcely if any more frequently than in patients of corresponding age periods who had exhibited no evidences of functional cardiac abnormalities during life.

In patients of this type, Christian does not await the onset of congestive failure for commencing digitalis medication. "Increasingly," he writes,[6] "I advise these patients continuously to take a daily dosage of digitalis. . . . I believe patients who have had the slightest evidence of cardiac inefficiency

profit from such continued digitalis ingestion. . . . The belief that digitalis is useful only in the presence of auricular fibrillation seems still to persist, though there is much striking clinical evidence against it, especially strong for this particular group of patients."

It is difficult to explain the favorable influence of digitalis in patients where the condition has not progressed to the point of congestive failure. Attempts have been made to show by animal experiment that digitalis favors in some unexplained way nutritive conditions for the myocardium and that animals fed digitalis over long periods of time show greater cardiac hypertrophy than is the case in the controls. These experiments are far from convincing, however, and more recent investigations fail entirely to substantiate the earlier reports. One must recognize the possible influence of suggestion in these early cases of cardiac derangement; indeed, some believe that any benefit following the administration of digitalis before the occurrence of congestive failure must be ascribed to the psychic influence.

Cardiac manifestations in patients with hyperthyroidism have long been recognized; indeed, the earlier observers considered this disease as involving the heart primarily. More recent studies seem to have established quite definitely that there is no specific cardiac lesion in hyperthyroidism, the functional and structural abnormalities of the heart encountered being the result merely of a speeding up of the rate and the prolonged over-activity.[19-28-33]

Theoretically, at least, it would seem that digitalis should be administered to patients where the condition of the heart appears to call for it, regardless of the presence of thyrotoxicosis. Some years ago, however, Plummer, of the Mayo Clinic, expressed the belief that digitalis was injurious in the presence of hyperthyroidism, a belief that is still held at this clinic, judging from the more recent utterance of Kepler.[18] Other clinicians contend that the employment of digitalis in cases of hyperthyroidism with congestive failure is of distinct value, and figures have been presented, indicating the routine use of the drug does not at all increase the mortality rate in these patients.[17]

In collaboration with Dr. E. G. Williams and Dr. Gudger, the attempt was made to ascertain by animal experiments whether digitalis is harmful in the presence of acute hyperthyroidism. For this purpose, a series of nine cats received daily feedings with dried thyroid substance for at least eight days. At the end of this time, most of the animals showed a definite loss in weight, slightly elevated temperature, and an increased heart rate. In spite of the existence of these signs of hyperthyroidism, the resistance of the animals to digitalis, as determined by the method of Hatcher and Brody, was practically the same as that of a series of six control cats. Six dogs were fed dried thyroid for a period of nineteen days. There was a marked loss of weight in only two of the animals, but others showed great excitability and rapid heart rate at the end of the period of thyroid feeding. The average "Hatcher" dose of a tincture of digitalis as determined on a series of eight control dogs was 1.25 c.c. per kilogram body weight; the average for the six thyroid-fed animals was practically the same: 1.3 c.c. per kilogram. These results lend no support to the view that there is increased susceptibility to digitalis in the presence of acute hyperthyroidism; on the other hand, they do not prove that digitalis administration is beneficial or even innocuous to the human patient with thyrotoxicosis.

The advisability of administering digitalis to patients with lobar pneumonia has long been the subject of discussion. Until comparatively recently, in spite of the contrary view held by Mackenzie, Carhart, Brunton and others, the general consensus of opinion among clinicians favored the use of the drug in this disease. The soundness of the practice seemed to have been established by the work of Cohn[7] and his associates at the Hospital of the Rockefeller Institute; and additional support was offered in the reports of Stone, Phillips, and Bliss,[32] of Brooks and Carroll,[3] and Stone.[31]

What basis exists for the employment of digitalis in pneumonia? The earlier observers were impressed by the evidences of failing circulation, as well as by the discovery that cardiac lesions could be demonstrated in patients dead of lobar pneumonia. More critical study, however, has failed to establish that circulatory depression occurs uniformly in this disease; indeed, as recently pointed out by Cole,[9] in some cases the blood-pressure may be but little affected, the pulse of good quality, and the heart sounds loud and clear almost to the moment of exitus. The work of Porter and his associates,[24] of the Harvard Medical School, likewise, indicates that in experimental pneumonia the cir-

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culation is not primarily involved; death of the animals resulting from failure of the respiration. It would seem, therefore, that the *routine* administration of digitalis in pneumonia is an irrational procedure, governed solely by empiricism.

On the other hand, Cohn,[7] and more recently, De Graff, Travell, and Yager,[11] have clearly demonstrated that cardiac involvement occurs in a certain proportion of patients ill with pneumonia. Especially important is the observation that auricular fibrillation is encountered in approximately 4 per cent of all pneumonia patients.[9] Certainly a fibrillating heart is severely handicapped at the outset in attempting to carry on the circulation through consolidated lung tissue; moreover, the occurrence of cardiac dilatation, with or without fibrillation, would seem to constitute a theoretical reason for the employment of digitalis in pneumonia.

No attempts seem to have been made to determine directly by animal experiment the influence of digitalis administration in the presence of pneumonia. When animals are practically moribund following the injection of diphtheria toxin, their resistance to digitalis poisoning is reduced, but this may be explained as the result of decreased blood volume. Of course, it is not permissible to conclude from the results of experiments on diphtheria-poisoned guinea-pigs or cats what the reaction of patients suffering from pneumococcus infection would be; nevertheless, Myers[23] has recently attempted to do this in a paper that is remarkable not only for such an unjustifiable assumption but also on account of the author's apparent ignorance of some previous investigations he refers to and also because of reported results that are unique. In spite of Myers' contribution, it may be safely asserted that no evidence of a satisfactory nature for or against the use of digitalis in pneumonia has been obtained by animal experiments.

The most exhaustive investigation as yet carried out in the attempt to determine clinically the influence of digitalis administration in pneumonia was undertaken at Bellevue Hospital and the results reported by Niles, Wyckoff, Dubois, and Woodruff.[25-37] In this study, errors committed by earlier observers were avoided, and adequate control observations were run simultaneously. Digitalis dosage was quite large but within what is generally considered safe limits; especially during the second year of the investigation. Data were secured on 742 patients; careful analysis revealed that digitalis routinely administered was definitely not of benefit; indeed, the general impression is gained that a deleterious influence was exerted by the drug. Especially discouraging were the results from digitalis administration to patients with auricular flutter or fibrillation. It is true that the number of such cases was small; seventeen controls and sixteen digitalis-treated; nevertheless, the occurrence of a mortality rate of 87.5 per cent in the digitalis-treated patients as compared with one of 52.9 per cent in the untreated controls does not indicate that the drug exercised a "life-saving influence" in this condition which is supposed to constitute the most important indication for the use of digitalis.

Relying chiefly on other therapeutic measures, a very accurate knowledge of the actions and limitations of drugs is scarcely to be expected of surgeons. When one considers the use of digitalis by many surgeons, it is obvious that pessimism as to their pharmacological knowledge is amply justified. So often, unfortunately, digitalis may be used in a routine manner pre-operatively, with no attempt at selection of cases; almost as often, the drug is administered to those patients in a critical condition after operation without any effort, apparently, being made to determine the factors directly responsible for this condition. There is no doubt that circulatory involvement is a matter of prime importance in some of these cases, but, in other instances, the circulation may be involved only secondarily; moreover, even when the circulation is involved, the disturbance may be vascular in origin with a heart normal in structure and function up almost to the moment of death.

Let us consider somewhat in detail the matter of traumatic shock. It has been fairly conclusively shown by recent investigators[2] that the falling blood-pressure and development of collapse in this condition is due to a loss of fluid from the cardio-vascular system, this loss being due to extravasation of blood and of plasma into the traumatized region. Especially interesting has been the observation of Blalock[2] that of the therapeutic measures resorted to in the treatment of experimental shock, ". . . digitalis has been consistently the most harmful and has uniformly been without benefit." Apparently, shock developing after severe burns is due to the same loss of fluid from the vessels; in both forms of shock, what has actually occurred is equivalent

to hemorrhage. This being the case, the observations of Gold,[15] showing that animals bled half their estimated blood volume are far less resistant than the controls are to poisoning by crystalline strophanthin (ouabain), are of considerable significance. The routine administration of large doses of digitalis, especially by intravenous injection, to patients in surgical shock or after massive hemorrhage not only is irrational, but, from Gold's results, would seem to be accompanied by definite danger.

One should not lose sight of the fact, however, that patients requiring surgical operation are not immune to heart disease. It is a fact that is not generally appreciated that the cardiac patient may stand operative procedures remarkably well, Sir Thomas Lewis going so far as to write: "It will simplify if it is here said that there is no condition of the heart, other than one which is itself immediately jeopardizing life, that prohibits operations being undertaken to meet a grave emergency."[20] Obviously, in these cardiac patients requiring operation, digitalis should be administered as the indications for it exist.

There is still, in all probability, much that is to be learned of the action of digitalis, and even more of altered function in pathological states. The final word as to the uses and limitations of the drug cannot be spoken until these gaps have been filled. In the present state of our knowledge, however, it has been clearly established that digitalis is of great value in certain conditions, of questionable service in some, and probably injurious in others.

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THE DIAGNOSIS OF SYPHILIS OF THE GASTROINTESTINAL TRACT.*

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Granulomatous masses occur in various parts of the body and are found in the gastrointestinal tract where they are more frequent in the stomach and colon. There has been much confusion in the past concerning the specific nature of these inflammatory tumors and, while much has been done in recent years to clarify the problem, doubt exists in the minds of many clinicians of their specific nature. The objects of this presentation are, first, to show that syphilis is the cause of certain of these granulomas, and, second, to suggest certain diagnostic criteria by which the lesion may be identified clinically.

These granulomas may be due to amebiasis, syphilis, tuberculosis and chronic pyogenic infection, the last being classed as non-specific granulomas. There has been no doubt of the tuberculous and amebic origin of these masses although Moschcowitz and Wilensky[1] have shown that some of the cases reported as tuberculous are in reality non-specific (pyogenic). About the syphilitic ones, however, there has been much argument, and many physicians, pathologists and surgeons still feel that syphilis is in fact not a cause of these lesions.

Unfortunately the microscopic pictures of these granulomas, regardless of the cause, are very nearly the same, there being fibrous tissue in various stages of development, deposits of lymphocytes and giant cells and necrotic tissue. The final word would seem to lie with the discovery of the causative organism in the mass. This, again, unfortunately, is very difficult to accomplish, as in all chronic lesions, but it has been done with each of these types although only rarely in the tuberculosis and only once without doubt in the syphilitic lesions.

It would be well at this point to describe the lesion. Meyer and Singer[2] have given an excellent description of the gross appearance of it. In the early stages there is a deposit largely in the submucosa which is soft and pliable and may actually escape detection at operation in spite of the large lesion demonstrated by X-ray examination. Later fibrous tissue is formed and all coats thickened until a mass is formed. The peritoneum over it is thickened, congested and often edematous. The whole area is very firm and may be adherent to surrounding structures. On opening the lumen a large ulcer is seen. It is usually shallow with granulating base and as a rule involves the entire circumference of the lumen. Lesions outside the stomach or bowel are frequently seen and help to identify the mass. The most frequent of these are regional lymph nodes which are enlarged and soft. Gumma may be found in the liver. The microscopic appearance as described by Dr. Pusch in reporting one of our cases is as follows: "The floor of the ulcer was composed of a thin layer of necrotic celluar debris, overlying young granulation tissue densely infiltrated with lymphocytes, plasma cells, and fewer polymorphonuclear leucocytes, in part interwoven with muscularis mucosae. Several gummatoid areas were observed but no classical gummata. Beneath, the increased thickness of the mucosa was due to edema, fibroblastic proliferation, and dense well-circumscribed, perivascular and perilymphatic aggregations of lymphocytes and plasma cells. These sharply defined perivascular groups constituted the most constant feature of the histopathology. They extended throughout the wall of the stomach, through the hypertrophied musculature into the serosa, and also far beyond the margin of the ulcer, presenting a greater extent of inflammatory response than is usual in non-specific inflammation. They occurred partly as mantles about the blood vessels, and partly as eccentric nodules associated with adventitia. For the most part the blood vessels themselves were not altered, although in a few instances both arterioles and venules had narrow lumina and thickened walls effected by medial hypertrophy and fibroblastic proliferations involving intima, media and adventitia;

*Read before the Richmond Academy of Medicine, January 8, 1935.
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In some instances inflammatory infiltration of the vessel wall itself occurred. The margin of the ulcer was abrupt in some areas, composed of intact, edematous hyperplastic mucosa infiltrated with plasma cells and lymphocytes. In other portions such a mucosal border was separated from the ulcer proper by a narrow tapering zone in which the superficial half of the mucosa was necrotic, ragged and mixed with inflammatory exudate. At times occasional miliary gummata were found with or without necrosis or small giant cells. The regional lymph nodes presented essentially the same changes."

What evidence is there that these granulomas may be syphilitic? In the first place, the response to specific treatment has been satisfactory in many cases. Karshner[3] reported two cases with obstructing lesions of the colon sufficiently relieved by treatment to avoid operation. The author[4] reported a similar case in the stomach and a number of others have been reported. That the lesion does not entirely disappear in treatment and that some cases are not benefited by treatment is explained by the presence of intense fibrosis which is probably due to secondary infection as well as the specific cause. This failure of specific treatment to cure all cases has been used as an argument against syphilis as the cause of the lesion. Yet one would hardly question the syphilitic origin of certain central nervous system lesions and vascular degenerations because they were not restored to normal by specific treatment. The Spirochaeta pallida may be eradicated but the damage done to structures will not be repaired nor will fibrous tissue be absorbed. Warthen[5] and McNee[6] have reported the finding of spirochetes in the tissues of these lesions. Singer and Dyas,[7] however, are not willing to accept these as authentic and Pusch[8] says that "the demonstration of these organisms in sections of any tertiary syphilitic lesion always has been uncertain." Harris and Morgan,[9] however, have definitely recovered Spirochaeta pallida from a typical stomach lesion. They macerated portions of the stomach removed at operation and of an adjacent lymph node and injected them into testicles of young rabbits. With each they produced typical experimental primary luetic lesions from which they recovered innumerable typical spirochetes with which they reproduced the same lesion. At the Medical College of Virginia we have repeated this work on two occasions with resected stomach lesions typical of syphilis, but in neither case were we successful in recovering the organism. So far as I know this has not been confirmed and alone it might not be accepted, but with the other evidence it adds all that was necessary to remove the doubt of the syphilitic origin of certain of these granulomas. If one accepts this as true, it is then necessary to formulate criteria by which this diagnosis may be properly established. Some have held that Spirochaeta pallida must be demonstrated in the tissues. This is most difficult and has rarely been done in other tertiary syphilitic lesions, so is manifestly unfair as a requirement for diagnosis. The criteria of Harris and Youmans[10] modified somewhat seems adequate and fair. They are:

1. Evidence of organic disease of the stomach or intestine which on X-ray examination shows the deformity characteristic of syphilitic granuloma.
2. A comparatively young individual.
3. The presence of other evidence of syphilis.
4. A qualified improvement under anti-syphilitic treatment.
5. In cases operated upon, the presence of an inflammatory mass.
6. When tissue is removed, demonstration of changes compatible with syphilis.

The first of these is not generally agreed upon. Practically all textbooks on Roentgenology say there is no characteristic picture of this lesion, and most individuals say that it is indistinguishable from cancer. D. S. Lewis[11] has given the best description of the lesion in the colon. He says: "The barium enema picture is most typical, * * * there is a long, small channel fading gradually into the undilated hypertrophied colon above. This is in sharp contrast to the localized irregularity of the filling defect of carcinoma which, if obstruction be present, is followed by a markedly dilated colon above the stricture." The typical appearance is, then, a smooth tube with a funnel-shaped entrance and exit. This picture may of course be modified by other factors and by variations in the intensity of the fibrosis. In the stomach where it occurs most often in the pylorus this tube-like deformity has the appearance of a funnel, but there will be more variations than in the colon lesions. This X-ray appearance may be produced by carcinoma but it is unusual for the luetic lesion to produce any other deformity. As I said in another discussion of this subject,[4] it is "not exclusive to

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syphilis, but is sufficiently typical to be characteristic and should not be classed as indistinguishable from cancer."

The second is in striking contrast to cancer. The average age of our ten patients with this lesion was thirty-six and one-half years, while the average age for a group with cancer of the stomach was fifty-nine years.

The third is usually easy to demonstrate by history, physical examination, or laboratory tests. Two of our patients had negative blood Wassermann tests but both had had treatment and both had other obvious luetic lesions.

The fourth has been discussed above; the results of treatment are dependent on the intensity of the fibrosis and damage to the organ.

The fifth has been discussed particularly by Meyer and Singer[2] who have had a large experience. They feel that the lesion has a characteristic gross appearance evidenced by its inflammatory nature with congestion and edema and with the firm feel of a thick walled tube. The smoothness and regularity of the lesion are in contrast with cancer, as is the small size of the mass compared to the large deformity shown on the X-ray film. In early cases with definite X-ray deformity, it may even be difficult to demonstrate at operation. We have had one such case.

The sixth has been discussed above with quotation from Pusch who is in general agreement with other writers. As was said before, the microscopic appearance is nearly the same as that of other granulomas, so that, on this basis alone, it would be difficult to prove its syphilitic origin.

The clinical picture presented by patients with this lesion is not characteristic. The stomach cases present symptoms very similar to those with cancer except the loss of weight is not so striking and the patients are usually much younger. They complain of vague indigestion, gas, epigastric pain, and, finally, when pyloric obstruction develops they have nausea and vomiting. Bleeding from the ulcer is frequent and at times very profuse. Gastric analysis shows a total absence of free hydrochloric acid and X-ray examination usually shows the funnel-shaped deformity described above. When the bowel is involved they have abdominal pain, diarrhea with blood and mucus, and finally obstruction with pictures varying according to the location. The blood Wassermann reaction is almost always strong positive.

There may be other manifestations of syphil The most important are severe secondary anem and damage to the liver. Two of our patients di from these complicating factors. Others ha aneurysms, condylomata, and skin lesions. W have had ten cases, eight of the stomach and tw of the colon. All of them have been reported ex cept one. A summary of this case is as follows:

V. M., a married colored female of 33 years (St. Philip Hospital No. 22877) was admitted to the hospital on September 3, 1934, complaining of stomach trouble. She had been treated in another city for ulcerated areas about the vulva and this was continued by a urologist here until five months ago when the lesion healed. The bladder was incontinent but this was thought to be due to the damage done by the ulcerated vulva because there were no signs of central nervous system lues. During this treatment she had had long series of injections of salvarsan, mercury and iodides by mouth, and tartar emetic. On two occasions she had developed arsenical skin rashes. She had had only one pregnancy and this resulted in a miscarriage. For about a year she had suffered with gas after eating, and during the last three months she had rather severe griping pain in the epigastrium, coming soon after eating. A few days before admission she vomited a large quantity of food. She had lost about twenty pounds in weight, due, she thought, to the small amount of food she was able to take. Physical examination was unimportant except for the malnutrition and the scars on the vulva from the lesion mentioned above. The urinalysis, blood counts, and blood chemistry were essentially normal. The blood Wassermann was strongly positive. X-ray examination of the stomach revealed the funnel and tube-like deformity shown in Fig. 1. There was a residue of 50 per cent of the meal in the stomach after six hours. Gastric analysis showed free hydrochloric acid from 20 to 36 with combined acid from 10 to 16. She was operated on and a lesion found typical of syphilitic granuloma. The mass was resected and the stomach repaired by the Billroth I method. The pathological report from Drs. Pusch and Nelson was as follows: "No mucosa seen (section through base of ulcer). In its place is a zone of inflammation, of round cells with many empty capillaries, the inner edge of which is a ragged

Fig. 1.—X-ray appearance of the stomach.

necrotic layer of cells, chiefly round cells, but with some polys. The submucosa is markedly thickened by edema and fibroblastic proliferation with scattered areas of lymphocytic infiltration especially about the blood vessels. Such areas are fairly well defined. The blood vessels show thickening of the media in two instances, and some are obliterated. The musculature shows scattered areas of round cell infiltration with multiple miliary gummata. The serosa shows sharply circumscribed areas of round cell infiltration with an occasional giant cell and with extravasated red blood cells apparently due to operative trauma. A lymph node section shows nothing of note. Pathological diagnosis: Syphilitic ulcer of stomach."

Fig. 2.—Microphotograph through the submucosa showing fibrosis, edema, and round cell infiltration about blood vessels.

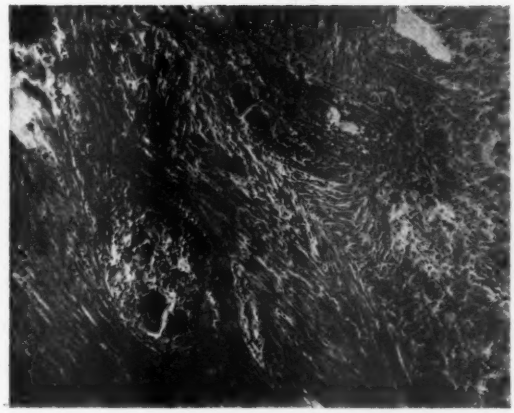

Fig. 3.—Microphotograph through the muscularis showing miliary gummata.

She made a good recovery and X-ray examination made four weeks later showed a good-sized stomach with no delay in emptying and no residue after six hours. She has remained well. The tissue from the stomach was injected into the testicles of young rabbits after the method of Harris and Morgan, but spirochetes were not recovered.

SUMMARY

The evidence tending to prove the syphilitic origin of certain granulomas of the gastrointestinal tract has been presented. The criteria necessary to be fulfilled in order to make such a diagnosis are presented and briefly discussed. The clinical picture is outlined and finally a case of syphilitic granuloma of the stomach is presented.

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EXTRAGASTRIC MANIPULATION FOR REMOVAL OF FOREIGN BODIES IN STOMACH BY WAY OF THE ESOPHAGUS.

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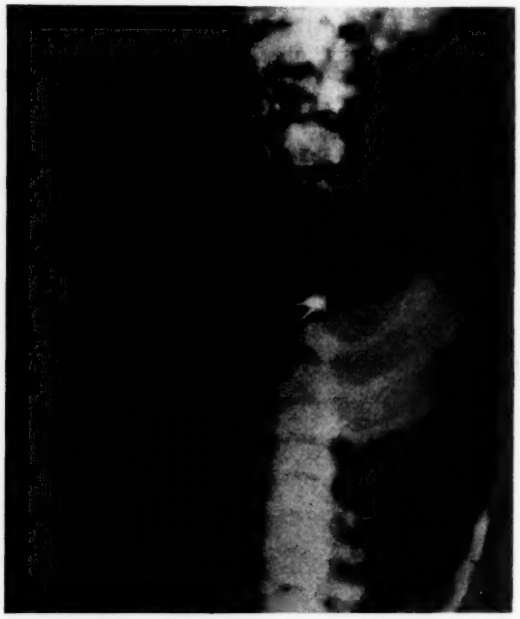
The removal of open safety pins from the stomachs of children, by way of the esophagus with the use of a tube, and without gastrotomy, has been done in various ways, of which the methods described by W. Banks Huff are good examples. Slightly different mechanical principles are involved in these methods but in the infant they expose the stomach wall to the possibility of traumatization and rupture when closing the safety pin.

I wish to describe a method which is adaptable for the removal of safety pins and some other objects, which does not necessitate traumatization of the stomach wall, and to submit a report of two cases in which I used the method with success. These cases were admitted to the surgical service of Dr. Edmund Horgan, at Children's Hospital, Washington, D. C.

Case 1.—An eight-month-old white male child was admitted to the Children's Hospital on July 18, 1930 (Case No. 30-1071). The child had swallowed an open safety pin that morning; he was extremely irritable and excited and had a temperature of 101.8 degrees per rectum when seen by me. He had been taken since the accident to three other hospital dispensaries in the city, at one of which an unsuccessful attempt had been made to remove the foreign body through an esophagoscope, for, until that time, the object had remained in the esophagus. The parents then became insistent that the object be removed surgically.

The past history and family history, the physical examination and routine laboratory tests gave no contraindications for operation. A roentgenogram showed an open, medium-sized safety pin in the stomach. The patient was operated on the same day.

The operation performed under anesthesia induced with ether consisted of a high, right abdominal section to permit extragastric manipulation of the safety pin. After the stomach was exposed and the object located, the anesthetist, Dr. E. Macon, passed down the esophagus into the stomach a rubber catheter which encased a sliding silver wire having a loop



on its distal end. After the open safety pin was engaged in the loop by me, the anesthetist slipped the catheter down, the enclosed wire fixing the safety pin against the distal end of the rubber catheter. As the anesthetist then made steady traction on the wire and catheter, I guided the safety pin through

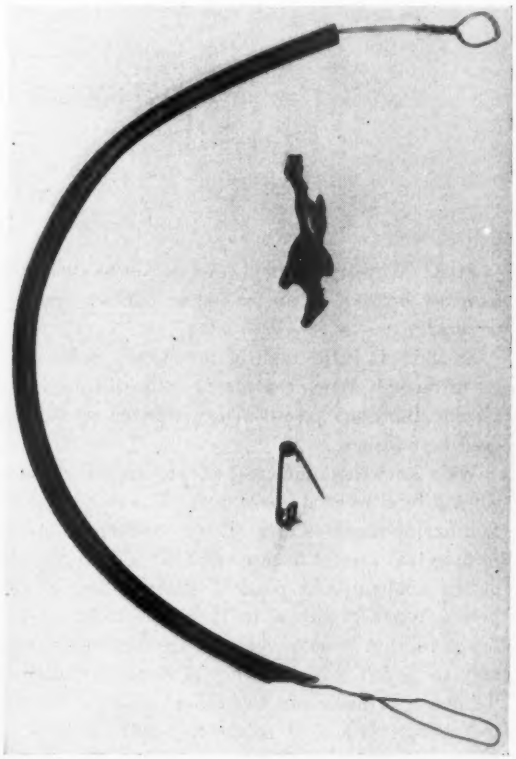
the cardiac orifice manually, and the catheter and wire, with the pin attached, were withdrawn by way of the esophagus. The abdominal wall was then closed in the usual manner.

A wound infection, causing some separation and leaving a small incisional hernia, complicated the otherwise uneventful recovery. The child was discharged on the first of August, 1930, two weeks after the date of admission.

Case 2.—A negro infant, eleven months old, was admitted to the Children's Hospital on July 18, 1930 (Case No. 30-3445), and discharged August 18, 1930, entirely recovered and in good condition.

The chief complaint on admission was that at intervals during the preceding month the child had had vomiting and diarrhea associated with a progressive loss of weight and slight abdominal distention, with generalized tenderness over the abdomen. Three days prior to admission, the patient had been brought to the orthopedic clinic because of a "lump in her back." An X-ray of the lower thoracic and upper lumbar spinal regions, taken at this time, showed "a metal toy, 1x5 cm., in the abdomen, probably in the small gut." The foreign body had not changed its location, as shown by a subsequent X-ray taken on the day of admission to the hospital, three days after she was seen in the dispensary.

A clinical study, including the patient's history, physical findings and routine laboratory tests, gave no contraindications to operative intervention, except that the general condition of the child was poor, being under-weight and dehydrated; accordingly, saline and glucose infusions were given intravenously in preparation for the abdominal section to remove the foreign body the morning following the day of admission.



The operation was performed, under anesthesia induced with ether, through a high, right rectus incision. As the foreign body was found to be lodged in the pylorus, it was first "milked" back into the stomach, then engaged by the wire loop of the tube which had been introduced into the stomach by the anesthetist, as described in Case 1, and similarly removed. The foreign body in this case was a small toy horse and rider made of lead, measuring 1.9x5.7 cm.

Following a convalescence which was compli-

cated by symptoms suggestive of lead poisoning, though this diagnosis was never confirmed, the child recovered and was discharged from the hospital in good condition.

COMMENT

The above descriptions, supplemented by the illustrations, serve to explain the simplicity of a technical method for the removal of foreign bodies from the stomach by way of the esophagus, and without gastrotomy, which has the advantage of being more adaptable than any previously reported method, lessens the severity of the operative procedure, and eliminates traumatization that might be caused by closing a safety pin by pressure on the stomach wall or by gastrotomy, and does not make it necessary to interfere with the feeding by mouth after the operation.

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PROBLEMS IN BREAST FEEDING.*

JOHN S. WEITZEL, M. D.,
Richmond, Va.

First: Why are the mothers who fail to yield satisfactory breast milk increasing in number year after year?

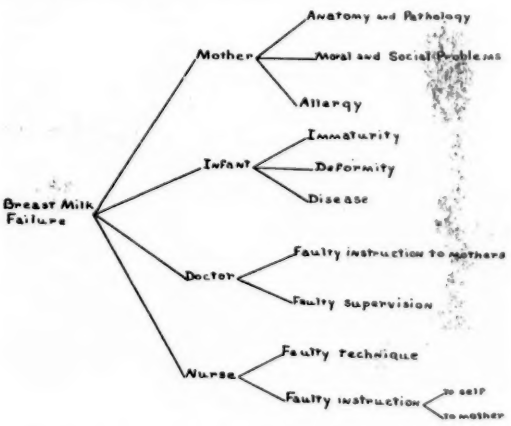
Second: Is it the fault of the mother, baby, doctor or nurse? When confronted daily with this perplexing problem, a satisfactory solution would indeed be welcome.

We acknowledge the great advantage to the infant when it receives good breast milk. However when we familiarize ourselves with all the problems of breast feeding that present themselves, after a careful study of the anatomy and possible abnormalities of the breast, together with a study of the cause of deficient milk in those breasts and the treatment necessary to correct this deficiency, I doubt seriously if the doctor or nurse can be held accountable for this unfortunate failure of nature to fulfill its duty. I believe the real cause can be placed upon the mother or baby.

I present this paper that we may face facts rather than fallacies.

When definite problems present themselves, and when present-day customs are thrust upon us, we cannot evade the issue. The outline below attempts to present this breast feeding problem briefly.

The anatomic, histologic or pathologic problem will be considered first. In the slides shown later you will notice the marked difference in the cross section of the lactating human female breast compared with the cross section of the udder of the cow. The latter is a true milk producing organ, while the human female breast is not a practical milk producing organ, especially when subjected to the customs and conditions of present-day living.



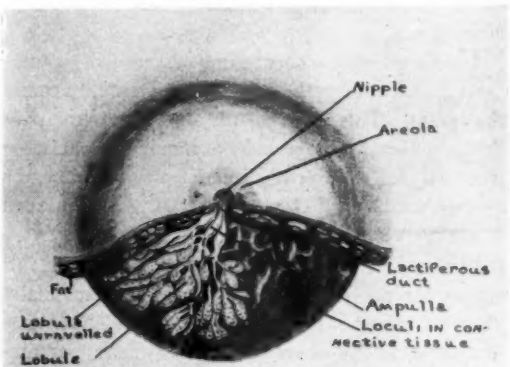
Seldom do we see a mother with an ideal breast for secreting abundant milk, namely, the spherical or conical breast, somewhat pendulous, with a prominent nipple arising abruptly from the inner margin of the areola. The breast that secretes most milk is possessed of very little fatty tissue, an abundant blood supply, and very little interalveolar connective tissue. Posture would necessarily have some

*Read at the sixty-fifth annual meeting of the Medical Society of Virginia, in Alexandria, October 9-11, 1934.

bearing on this problem. The human female standing erect or lying mostly on her back, discourages gravity towards the nipple, which should be the most dependent point; especially is this true during the most important stage of lactation, the first ten days post-partum. At this time the lactiferous ducts may easily become obstructed by the sticky, yellowish white colostrum, or from the engorged breast of the third to fifth day, and a chocked breast results. Large painful nodules form at the base of the breast, especially in the axilla, which is the most dependent point, and serious complications may arise. As soon as a stasis in the milk stream occurs, the phenomenon of involution sets in, and the fat which should be secreted as milk is returned into the circulation. Depressed, excoriated or cracked nipples, as well as abscess of the breast, must be mentioned under this heading.

To elaborate somewhat upon the anatomic and histologic aspect of this problem, one is compelled to make a careful observation of the gross structure of the human female breast, and compare it with a natural milk-producing organ, namely, the udder of the cow.

At this point a picture of the human breast, eliciting the gross anatomy, taken from Gray's Anatomy is compared to the gross anatomy of the udder of the cow, taken from Sisson's Anatomy.



Dissection of the lower half of the female breast during the period of lactation. (From Luschka)

We observe, first, that from the natural law of gravity, the human female breast is constructed under normal condition to drain uphill, while the udder of the cow under the same condition is constructed to drain downhill, which as we all know is practical and indeed necessary. Observing more closely, we see that the secretion of a lobule and ultimately the entire lobe is expelled into a tiny constricted lactiferous duct, which later empties into the ampulla or trap, as I may call it, which is a dilatation of the lactiferous duct, and offers an ideal location for the thick tenacious colostrum and thick fat globules to accumulate, only to be asked to evacuate themselves through a second constricted portion of the lactiferous duct.

Cross Section of Mammary Glands of Cow
a, Body of gland; b, lactiferous sinus; c, cavity of teat; d, duct of teat; e, intermammary groove; f, septum between glands; g, supramammary fat.

How impractical, and I might say impossible, this seems when compared to the accompanying photograph of the natural milk producer, the cow. Here we see the organ with its structure always draining to the most dependent point, with the lobules and lobes respectively communicating almost directly with a true cavity or cistern. A cistern it is, for, if one cuts the end off the teat, a finger can easily be passed well up into the substance of the gland. This, to my mind, is where the real problem lies, for, in comparing the histological structure as shown in the accompanying photographs, one, the human, taken from Piersol's Anatomy, and the other, the cow, kindly sent me by the Bureau of Animal Industry, Washington, D. C., you will notice in the non-lactating breast that practically the same order in structure is noted, that is, the basement membrane, supporting the single or double layer of cuboidal or low columnar cells, with their nuclei about midway of the cell. The interalveolar stroma, involuntary muscle fibre and connective tissue formation vary, of course, according to the type of breast, but compare almost exactly with each other.

XUM

Upon passing to the lactating breast in both the human breast and udder of the cow the same picture presents itself as shown, namely, when the alveoli become distended, the cuboid or low columnar secreting cells vary with the degree of distention of the alveoli, being low in large compartments and higher in those less expanded. The protoplasm of the cells contain minute oil droplets that occupy chiefly the

inner zone. The nucleus of the cell is pressed towards the basement membrane. The cell, projecting into the alveolus, is separated from the lumen by a thin protoplasmic stratum. Finally this thin stratum ruptures, and the oil droplets escape into the albuminous fluid that occupies the alveolus.

It is obvious, therefore, that a simple mechanical problem presents itself when the glandular structure of a breast is to secrete sufficiently or insufficiently. This mechanical problem is one of pressure. As stated in this paper, it is recommended to allow the baby to nurse each breast for five minutes every four hours, rather than nurse one breast only for the entire nursing time, thus allowing the other breast to remain undisturbed for eight hours. When the breast is not nursed for eight hours, the alveoli become so distended and the pressure from within is so great that the columnar cells become flattened out, and the thin protoplasmic membrane is not permitted to rupture. As a result, the fat globules are reabsorbed into the circulation instead of being evacuated into the alveolus as milk.

Moral and social problems require our next consideration. Dr. Abt in one of his articles on Breast Feeding makes the following statement: "The progress of civilization and the stress of modern life have introduced new problems for thoughtful reflection."

Many mothers of today feel their children should not be a burden, and are easily persuaded to neglect their duty to the nursing infant.

The necessity for mothers to work today cannot be questioned. Upon inquiry, the following data was obtained with regard to the number of married women working in Virginia: In 1910, 45,814; in 1930, 58,924—an increase of 13,000 in twenty years.

If a mother is working all day in an endeavor to support the family, it is evident that she cannot nurse her child satisfactorily during the night, and certainly not during the day, insufficient breast milk being the ultimate result of these two major problems. Mention and brief discussion of other possible causes of insufficient breast milk will follow.

One very important etiological factor that justifies our consideration is the age of the mother. Many married women defer child bearing until they arrive in the thirties or early forties.

Improper dress should be mentioned under this heading. Thought should be given to the constricting brassieres and appliances that are in common use today, exerting undue pressure upon the glandular structure, nerves and blood vessels of the mammary gland.

I acknowledge a very common cause of insufficient breast milk is the failure of the baby to empty the breast. This is frequently due to extreme pain to the mother while the baby is nursing the breast—from fissured or inverted nipples. As you know, the average mother of today cannot easily be persuaded to endure unnecessary pain.

We are told that breasts will not yield their full supply unless every drop is expressed manually after the infant has finished nursing, and Abt states that on occasions where the breasts were apparently completely emptied by the manual method, considerable amount of milk could be obtained with the electric pump. In Pfaundler and Schlossmann we find this statement: "The complete emptying of the milk glands is procured only by the nursing child; no other means can secure this result as is possible in the cow. It is impossible to empty the human female breast either with the breast pump or by the most thorough manipulations."

Manual expression is impractical from the fact that the human female breast is not constructed for satisfactory manual expression. The tender character of the breast tissue ordinarily will not tolerate manual expression, especially with an engorged breast, and this manipulation may predispose to inflammatory processes or even malignancy. Some danger of infection must be thought of when manual expression is carried out by nurse or maid.

Further consideration of the causes of weaning other than insufficient breast milk prompts me to present the results of a questionnaire sent out by the Bureau of Vital Statistics of Virginia in 1926. At that time they desired to make a statistical study of the prevalence of artificial feeding. The result was as follows:

638 infants were reported.

52 per cent of all infants weaned during the first six months were by advice of physicians. 56 per cent of this number were white, and 21 per cent were colored.

In 158 cases weaned on the mother's account, the reason for weaning was tabulated as follows:

Insufficient milk	86
Mother's milk disagreed	22
Not gaining on breast	11
Baby would not nurse	9
No milk	3
Weak milk	15
Reason unknown	12

Grouping these cases in a more condensed scheme, we might safely say:

Milk failure in quality or quantity	136
Possible allergy and reasons unknown	22

The miscellaneous causes due to mothers numbered 46, as follows:

Toxic conditions	3
Pregnancy	17
Nephritis	2
General weakness or sick	11
Contagious disease of mother	5
Abscess of breast	2
Abnormal breast	2
Mother employed	4

Of the remaining 17 cases, there were:

Mother died	5
Mother had T. B.	5
Mother denied her baby	5
Mother not interested	2

In addition to the above-mentioned causes, emphasis should be laid upon the question of allergy. Dr. Warren Vaughan makes this statement: "Anything that the mother is sensitive to will react upon the nursing infant." Allergic substance in mothers could very easily account for such conditions in the infant as colic, urticaria, intertrigo, eczema, asthma, vomiting, coryza, pharyngeal catarrh, angina, glandular swellings, middle ear catarrh or bronchitis.

In our attempt to clarify these breast feeding problems, the second in order for discussion would naturally be the infant. The faults that can be directly placed upon the infant are:

1. Prematurity, immaturity or some cerebral injury at birth.
2. Various infective disorders, such as sepsis neonatorum, icterus, eclampsia or hemorrhagic disease.
3. Indigestion from irregular or too frequent feedings or injudicious purgation.
4. Morbid condition of the infant's nose, mouth or upper air passage, such as thrush, stomatitis, adenoids, bronchitis, cleft palate, or hair lip.
5. Congenital dyspepsia.
6. A neurotic temperament.

The refusal of the infant to take the breast during the first three days of life is one of the most trying conditions with which we have to deal. The mother becomes tired and upset, her condition acts unfavorably upon her milk, and mother, infant and physician are disturbed as a result.

The doctor is the next in order in this discussion. The impression conveyed by the results of the questionnaire made by the Virginia Bureau of Vital Statistics in 1926 places most of the responsibility upon him. The thought I wish to convey is that the majority of cases seek medical advice, and the doctor, conscientious in his work, with a mother having an obvious deficiency in breast milk and with the infant's welfare at stake, would certainly be the one to recommend weaning after all means to restore the breast milk have failed.

The measures necessary to prevent weaning will be discussed under a discussion of the treatment. The nurse, being the last of the four parties involved in this problem, will be mentioned also under the same heading.

Treatment of Mother. Prophylactic: High school girls and all girls approaching womanhood should be instructed in the importance of breast feeding and the measures necessary to produce good breast milk. Those who are married should be enlightened

as to the most favorable age to bear children, that is between the ages of 20 to 35. Married women and expectant mothers should be thoroughly schooled in the proper diet, hygiene, exercise and rest, both physical and mental, as well as the necessary steps to be carried out in preventing and correcting inverted and tender nipples. All diseases and debilitating or toxic conditions should be eliminated, if possible. The mother should be thoroughly impressed with the advantages of good breast milk and to the protective substances therein, as well as its nutritive value, ease of digestion, safety and economy. Her indulgence should be insisted upon in experiencing discomfort and inconvenience.

Active Treatment: Supervise carefully the first ten days of her post-partum period with regard to her posture, as well as the technique in nursing; emphasize the point of having the baby grasp the breast well into the areola instead of the nipple only. Manual expression should be used when the baby fails to empty the breast, unless contraindicated by extreme pain. Both breasts should be nursed and both emptied when possible every four hours either by manual expression or by the electric breast pump. A tight breast binder should not be used; however, a loose sling to support the breasts well is to be recommended.

Thorough and detailed instructions in the problems of breast feedings should be given the obstetrical nurse to help her realize what an important position she occupies in bridging the relationship between mother and child. In her training the baby is put to the breast often as a matter of routine, and the many complications resulting from faulty technique and lack of patience and perseverance might mean the failure or success of breast feeding.

It is recommended that the application of 0.1 per cent hypochlorite solution by means of a compress for one minute will eradicate surface bacteria.

The outline suggested by Haynes as a guide to your management of breast feeding, so concretely expressed in six situations, should be applied when complementary or supplementary feeding is to be considered. This outline is as follows:

Mother	*Child*	
Gaining	Gaining	1
	Losing	2
Stationary	Gaining	3
	Losing	4
Losing	Gaining	5
	Losing	6

To explain this outline, I quote Dr. Royal Storr Haynes, Professor of Diseases of Children, Columbia University:

"The ideal result of a properly conducted lactation is to have the mother's weight stationary and the baby's weight rising steadily. These two factors will determine the success and progress of lactation and will give a better idea of the food value of the milk than chemical examination. There are six situations to be considered.

"Number 1 shows the mother is over-eating. After lactation she proceeds to reduce too suddenly, and may result in a nervous breakdown; therefore, limit the mother's diet.

"Number 2 shows mother over-eating, but unable to produce milk. Limit mother's diet, and give complementary bottle feeding.

"Number 3 shows the ideal condition, except in some instances the baby becomes too fat, in which case the time of nursing should be shortened.

"Number 4 shows mother is taking insufficient nourishment. Increase quantity and quality of mother's diet, in which case Number 4 will be transferred to Number 3 or Number 2.

"Number 5 shows mother is making milk at the expense of her own tissues, and cannot last long. An attempt should be made to change this situation to Number 3.

"Number 6 shows the mother is denying herself or is denied proper food, or has tuberculosis. T. B. should be eliminated before attempting a transformation to Number 3 or Number 1."

The problem of human lactation is complicated by the fact that the mother is not just a milk producer, but is a human being with a varied life, subject to psychic disturbances, and to demands upon her from persons other than her baby. The mental attitude of the mother may affect the quantity and probably the quality of her milk. Anxiety, fright, worry, annoyance, fear, all tend to diminish the yield, while a placid, contented mind, a good digestion and a pleased appetite tend to increase it.

The baby produces a better supply of milk, though his capacity may be less than the breast pump.

Saline cathartics, arsenic and salicylates should be withheld from a lactating mother.

During the first five days of life, if the initial loss of the baby is not more than 10 per cent of its birth weight, with a good nursing history, if the

mother has a goodly quantity of breast milk, supplementary feeding is seldom necessary.

Infants do well on one-half to two-thirds the amount of fluid which experience has shown necessary with cow's milk mixtures. This is probably due to the different protein and salt composition of human milk. Regardless of the quality and quantity of breast milk, we should be ever mindful of the fact that the best laboratory is the baby's own stomach. Giving sweetened or plain water discourages the infant to take the breast, and, if not given, predisposes to dehydration.

The stimulation period should not be less than four hours for each breast. As both breasts secrete at the same time, they become full together; it is logical to empty both rather than allow the milk in the untouched breast to be reabsorbed.

As regards the baby, it should be weighed before and after feeding so as to regulate the amount of water to be given to prevent dehydration.

Insist upon putting the infant to the breast the first three days after birth to give the baby the advantages of the colostrum, namely, in establishing normal digestion and weight development, whether or not the mother can nurse her child successfully. The problem often confronting us is, should we give a complementary feeding from the bottle immediately after birth to prevent unnecessary loss of weight and strength, so the baby will be able to exert more effort and empty the breast more thoroughly, or should we withhold complementary feeding, and allow the baby to get so hungry that it will empty the breast more thoroughly? Personally, I feel that a safe rule to follow is to give water only in sufficient quantity to prevent dehydration, namely, one ounce after each nursing. Permit the physiologic loss to take place up to the point that is 10 per cent of its birth weight at the fifth day. If the baby loses beyond this point, begin complementary feedings at once, at the same time exerting every possible effort to encourage the full function of the breast.

Dr. M. Pierce Rucker was kind enough to look over the records of 500 cases in the past year, and found, out of the 500, 289 gave sufficient breast milk, 120 were weaned and 91 had to have complementary feedings from the bottle during a period of thirty days from birth.

It might be of interest to recall to our minds the mortality rate of infants from all causes under one year of age in the State of Virginia:

1913	104.7	per 1,000	births
1923	82.6	per 1,000	births
1932	67.0	per 1,000	births

After all, with the simplified and successful bottle feeding in vogue at present, the highly efficient milk supply, based upon its excellent quality and low bacteria count, the tuberculin tested and disease-free cows, together with the wonderful improvement in the infant mortality rate, we are compelled to realize that no infant's life should be jeopardized by unnecessary delay in inaugurating bottle feeding. When all reasonable measures to establish and maintain sufficient breast milk are exhausted, and when, in spite of our efforts, more than a 10 per cent loss of the infant's birth weight on the fifth or sixth day is observed, I am convinced, from an anatomic, sociologic, economic and prognostic standpoint, bottle feeding, either in part or as a whole, is justifiable, and a simple, sane, safe, systematic and scientifically balanced bottle feeding should be inaugurated without hesitation.

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Maury Place.

DISCUSSION

DR. THOMAS D. JONES, Richmond: I will certainly not be able to add anything of much value to Dr. Weitzel's paper. I should like, however, to attempt to emphasize some of the points that he brought out.

First of all, as to the advantages of breast feeding over artificial methods, Lucas states that, of all infants reaching the age of two weeks that are artificially fed, one out of every five dies before the end of the first year, and of those that are breast fed only one in thirty dies before the end of the first year.

Statistics reached by the study of Wertheimer and Wolff of large groups of infants as regards duration of infection were as follows: Duration in breast-fed babies was from one-half to one week; in the healthy bottle-fed baby it was two and a half weeks, and in the non-thriving bottle-fed baby three to four weeks. The mortality figures in this group of infections was

as follows: Breast-fed—none; normal bottle-fed—ten to twenty-eight per cent; premature and non-thriving—forty per cent.

Woodberry's study of 22,422 live born infants in eight American cities reveal that the mortality in the artificially fed babies for the first month of life was over three times as great as in the breast-fed baby; four times as great in the second month, and nearly three times as great in the third month.

A recent study made by Grulee of over twenty thousand babies observed in the welfare stations in the city of Chicago showed that forty-eight and five-tenths of this group were entirely breast-fed; forty-three per cent were partially breast-fed, and eight and five-tenths artificially fed. There were two hundred and eighteen (1 1/10%) deaths in this group. Six and seven-tenths per cent of deaths occurred in the breast-fed group; twenty-seven and seven-tenths in the partially breast-fed group, and sixty-two and one-tenth per cent occurred in the artificially fed group. Many more equally as striking figures could be quoted, but the advantage of breast feeding is well enough established without further comment on this point.

The most important question arising from this paper, is, what can be done to bring about an increase in the number of breast-fed babies? I doubt if most of us a physicians take this matter as seriously as we should. Dr. Weitzel has mentioned the most frequent causes fo failure of breast-feeding, and as he has already indicated much can be done during the latter months o pregnancy in increasing the mother's ability to nurse her infant. A more wide-spread emphasis on the advantages of breast-feeding might prove helpful. A few years ago the State of Minnesota put on a breast-feeding campaign in a given area and reached practically every mother. The percentage of breast-feeding attained through this campaign was 96 per cent at the end of the second month; 72 per cent at the end of the ninth month. The high percentage of breast-feeding in Grulee's group was achieved through efforts of that sort.

Dr. Oliver Wendell Holmes stated that "A pair of substantial mammary glands has the advantage over two hemispheres of the most learned professor's brain in the art of compounding a nutritious fluid for infants." We are not at all sure that all the elements that go to make up a perfect food for infants have ever been discovered, and, until we can be sure of that, we should "make haste slowly" in depriving an infant of breast-milk—unless we are compelled to.

THE TREATMENT OF HABITUAL ABORTION.*

HOWARD F. KANE, A. B., M. D., F. A. C. S.,
Washington, D. C.

Rare, indeed, is the occurrence of spontaneous abortion when a healthy ovum is properly attached to a normal endometrium. Trauma should never be accepted as the cause of abortion until fetal, uterine and endocrine pathology have been proved to be absent.

As the most common fetal cause of habitual abortion is syphilis, examination of the patient and her husband for the presence of this disease should be the first step in the study of the case.

When several abortions have occurred, chronic hypertrophic endometritis is frequently found to be present. A diagnostic curettage in this type of case is often partly curative. Operation alone, however, is not sufficient treatment. The engorgement of the endometrium may be the result of endocrine disturbance and is probably only one factor in the causation of the premature expulsion of the ovum.

When no fetal or local maternal abnormality is present, it is almost certain that endocrine function is at fault.

For pregnancy to take place, the anterior lobe of the pituitary gland must secrete sufficient prolan A to stimulate the growth, development and maturation of the primordial follicles in the ovary. These follicles must produce oestrin in quantity sufficient to cause vascularization and hypertrophy of the endometrium. At this stage of the endocrine cycle, a fertilized ovum may find its way into the uterine cavity, but unless other hormones have prepared the endometrium for its reception, development will not take place. Prolan B must have changed the theca cells of the Graafian follicle into a corpus luteum and this body must have produced progestin.

An important function of progestin is the sensitization of the endometrium which changes it to decidua and provides a satisfactory medium for nidation of the ovum. Progestin also antagonizes the action of oestrin on the uterine muscles and

*Presented as part of a post-graduate course in Female Endocrinology at the George Washington University School of Medicine during May, 1934.

prevents the contractions, which, if present, would expel the ovum. That progestion is essential to the maintenance of pregnancy is proved by the fact that removal of the corpus luteum during the first half of pregnancy is almost certainly followed by abortion.

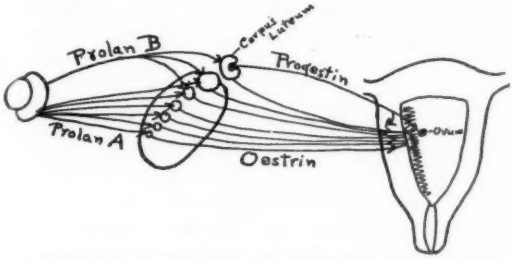

Fig. 1.—Prolan A goes to the primordial follicles and stimulates development. Meanwhile the follicles are sending oestrin to the endometrium, causing hypertrophy. Prolan B stops follicular development at the Graafian follicle stage and luteinizes the theca cells. Progestin from corpus luteum maintains endometrial hypertrophy, prevents uterine contractions, and, by sensitizing the endometrium, prepares it for nidation of the ovum.

The obvious course in the treatment of habitual abortion is to supply progestin. As this hormone has not yet been isolated for clinical use it is necessary to supply it by means not wholly ideal. In accordance with the theories of treating conditions in which a hormone is lacking, the proper procedure would be to stimulate the luteinization of the Graafian follicle by means of the anterior pituitary sex hormone. Prolan, however, while it stimulates the formation of the corpus luteum, at the same time causes an increased production of oestrin. It is the action of oestrin which must be antagonized, and while successful results have followed prolan therapy, clinical observations have shown that in many cases the oestrin evidently overwhelmed the progestin.

The most commonly available source of progestin is corpus luteum extract. While this substance contains some oestrin, the progestin dominates. The administration of corpus luteum is, of course, only substitutive treatment, but as it is necessary for only three or four months, substitution seems justified.

A satisfactory method of treatment, practically that suggested by Mazer and Goldstein, is carried out as follows:

Two ampules of corpus luteum extract are given subcutaneously every other day for ten doses. This procedure is repeated at three week intervals until the end of the fifth month. In addition, the patient takes one-half grain of desiccated thyroid three times daily for two weeks, and four grains of sodium iodide three times daily for the following two weeks; then, resuming the thyroid, a change is made to sodium iodide every two weeks. The patient's activities are not curtailed except in regard to intercourse, which is forbidden.

Of twenty-six women who have received this treatment, twenty-two have been delivered of living children or are now pregnant beyond viability. In one case premature separation of the placenta occurred at the end of the seventh month, and three patients aborted at about the third month. In one of the latter cases the fetus was probably dead before treatment was instituted.

As each of these patients had previously aborted from one to six times it would seem that in some instances, at least, the successful termination of pregnancy must be credited to the method of treatment.

NOTE:—Since this paper was offered for publication, progestin has become available under the name of Proluton.—H. E. K.

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1835 Eye St., N. W.

ANEMIAS DEPENDENT UPON FOOD DEFICIENCIES.*

JAMES P. BAKER, JR., M. D.,
Richmond, Va.

The concept of anemias conditioned by food deficiencies is of very recent origin. It has been customary in the past to consider very few diseases as deficiencies, only those associated with a specific vitamin lack. These are xerophthalmia, rickets, beri-beri, scurvy and pellagra. The recognition of even these is comparatively recent, for the earlier concept of disease was that a toxic or malign in-

*Read before the sixty-fifth annual meeting of the Medical Society of Virginia, at Alexandria, October 9-11, 1934.

fluence was at work. By deficiency diseases, we mean those caused by the absence or lack of a factor necessary for the body economy.

The past five years have seen several new diseases added to the list of those dependent upon a food deficiency, with the prospect that others may fall into this category. Of these, I shall consider only the anemias.

PERNICIOUS ANEMIA

It was Castle[1] who first showed that pernicious anemia was dependent upon a dietary deficiency. This deficiency resulted from an inability of the patient to digest suitable foods, rather than a lack of these foods. This was shown by a very simple experiment. Beef-steak was fed to a pernicious anemia patient without improvement in the blood picture or general condition. Then, to this same patient was fed beef-steak which had been digested in the stomach of a normal individual, with an improvement comparable to that obtained with liver feeding. This indicated that some process of digestion took place in the normal stomach which did not in the stomach of a pernicious anemia. From these results, there was postulated the existence of an extrinsic factor found in the food, and an intrinsic factor found in the stomach of normal individuals, the interaction of these two being necessary for the prevention of pernicious anemia. The extrinsic factor has been identified as closely related to Vitamin G,[2] being found in beef-steak, eggs, yeast, rice polishings, etc. The intrinsic factor is recognized only by the things which it is not, that is, it is not HCl, pepsin, rennin or lipase.[3-4] The substances commonly used for the treatment of pernicious anemia, liver and dried stomach, contain the product of interaction of the extrinsic and intrinsic factors.

According to this concept, it should be possible to produce an anemia identical with pernicious anemia by exclusion of the extrinsic factor from the diet. This has been shown to be possible in certain cases of sprue[6] and macrocytic anemias of pregnancy.[5]

Moreover, anemia indistinguishable from pernicious anemia has been produced in people receiving an adequate diet and having a normal gastric secretion, but who have some disorder preventing absorption from the intestine, e. g., stricture of the intestine[7] or a prolonged diarrhea.[8]

Thus we can have an anemia indistinguishable from pernicious anemia dependent upon any one of three deficiency mechanisms:

1. Absence of the intrinsic factor from the gastric juice.
2. Absence from the diet of the extrinsic factor (vitamin G).
3. Failure of the intestine to absorb the product of interaction of the extrinsic and intrinsic factors.

SPRUE

Sprue is a macrocytic anemia very similar to pernicious anemia, both in its symptomatology and blood picture. Outstanding features of the disease are the prolonged diarrhea and sore tongue. It is very prevalent in the West Indies, notably Porto Rico, but is met with quite frequently in the southern states. Formerly considered to be caused by the Monilia psilosis, it has recently been shown to be due to a lack of the water-soluble vitamin B_2, the extrinsic factor in Castle's concept of pernicious anemia.[6] In some cases there has been a lack of this in the food, in others an inability to absorb this because of the profuse diarrhea, and in a few, an apparent absence of the intrinsic factor from the stomach so that it could not be utilized. Thus the same factors of a conditioned deficiency exist in this disease as in pernicious anemia. The most satisfactory method of treating any case of sprue is by intramuscular or intravenous injections of liver extract, though most cases will respond to liver extract or vitamin B_2 extract by mouth.[9]

IDIOPATHIC HYPOCHROMIC ANEMIA

Among the anemias which are usually classified as secondary is one which has recently been distinguished as idiopathic hypochromic anemia. This was first recognized as a distinct entity by Faber in 1913.[10] It has, since then, been called by several names, such as simple achlorhydria anemia, chronic chlorosis, etc., but it is now generally known as idiopathic hypochromic anemia.[11]

This is not an uncommon disease. It occurs most frequently in women between the ages of 30-50 years. The onset of the disease is insidious, so that frequently these patients do not consult a physician until the anemia is of a severe grade. Fluctuations in the degree of anemia are common, but the blood seldom returns spontaneously to normal. Symptoms of the disease are not pathognomonic. They may include loss of weight, weakness, vertigo, abdominal distress with flatulence, lack of appetite, etc.,

nd menorrhagia is common. Atrophy of the ucosa of the tongue, giving a smooth appearance, sually occurs. The spleen is commonly enlarged. Brittle finger nails with a concave depression is a frequent sign of this disease. The blood shows a marked lowering of hemoglobin, a moderate lowering of the red cells, giving a color index of .6 or less. Leukocytes and platelets are usually slightly reduced. Free hydrochloric acid is absent or markedly diminished in the stomach contents.

The symptoms and signs just cited, together with the usual history of a grossly inadequate diet, and the prompt remission of the clinical symptoms and anemia when a good diet and large doses of iron are supplied, demonstrate that this disease is due to a chronic nutritional deficiency.

The dietary deficiency may have started because of indigestion, more and more foods being eliminated until an entirely inadequate diet resulted. These patients usually have taken for years a diet rich in carbohydrate foods, low in proteins, fresh vegetables and fruits. In addition to the inadequate food intake, there exists an altered gastro-intestinal function, evidenced in part by the absence of free hydrochloric acid from the stomach.

I mentioned earlier that menorrhagia was a frequent accompaniment of this disease. Such cases were formerly considered to be anemic because of the abnormal menstrual bleeding, but no local cause for this bleeding could be found, and the anemia improved very little after curettage of the uterus. On the other hand, large doses of iron with *no* local treatment to the uterus usually results in cure of the anemia as well as cessation of the menorrhagia.

It must be emphasized that large doses of iron are essential for the successful treatment of this disease. Six (6) grams (90 grains) of iron and ammonium citrate daily has been found to be the optimal dosage. Such medication, coupled with a diet rich in meats, fruits and fresh vegetables, produces a striking improvement in the clinical symptoms and anemia in two to three months. The disease is certain to recur unless iron treatment is continued indefinitely, for there seems to be a specific inability to metabolize the small amount of iron which is present in foods.

ANEMIAS OF PREGNANCY

The occurrence of moderate anemia during pregnancy has for a long time been considered a normal physiologic process, it being assumed that a portion of the mother's blood was utilized in supplying nourishment for the child. Severe grades of anemia during pregnancy were thought to be due to a toxic or hemolytic substance formed by the fetus which either inhibited bone marrow activity or destroyed the mother's corpuscles.

It has been shown[12] that such an anemia seldom develops except in the presence of an inadequate diet, and that it can be cured either during or after pregnancy by supplying a good diet and large doses of iron. It has been shown, further, that the anemia does not improve greatly after pregnancy if the patient be kept on her inadequate diet. Of course, the food deficiency of the mother is greatly aggravated by the demands of the fetus.

ANEMIA OF INFANCY FROM MATERNAL IRON DEFICIENCY

Now the last of the anemias I shall take up is that occurring in the infant about one (1) year after birth.[13] No matter how inadequate the mother's diet be during pregnancy, or how anemic she becomes, the child is usually born with a high hemoglobin and red count. At the end of the first year this has dropped to a normal level. In infants born from mothers who suffered from anemia during pregnancy, the blood falls a great deal more than normal, often reaching a very low level. Now, this anemia can be prevented by giving the mother iron during her pregnancy, or cured by giving the child adequate doses of iron. Apparently it is due to a lack of storage of iron in the infant because of an iron deficiency in the mother.

CONCLUSIONS

We have considered certain types of anemia which are dependent upon a deficiency of food elements. This deficiency may exist because of:

1. An inadequate diet.
2. Gastro-intestinal secretory defects.
3. An inability of the intestine to absorb the essential food elements.

A consideration of these factors will often clarify the etiology of anemias of obscure origin.

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Medical Arts Building.

DISCUSSION

DR. WILLIAM H. HIGGINS, Richmond: There is probably no disease occurring with such frequency in all the medical specialties as anemia. For that reason Dr. Baker's admirable paper should appeal to each of us, regardless of our professional leanings. The term "food deficiency" as a cause of anemia seems to me, however, to be somewhat misleading. Although food, as we generally use the term, might be looked upon as the common carrier of the so-called extrinsic factor, the minerals and vitamins that enter into the prevention of anemia, we can hardly say that food, *per se*, is the cause of anemia. I think it was Ashton, several years ago, who established that during starvation the blood is very little changed during the process of degeneration of the body tissues. In the primary anemias, as Dr. Baker has indicated, we do have a lack of the so-called extrinsic factor, which in itself is one of the links in the production of this disease; we have a lack of some of the minerals, such as iron, in the food of others, which actually does enter into the cause of the secondary anemias; yet our diets, as a whole, for normal individuals, have a remarkably high content of iron. Infants, of course, fed on milk alone for a long period of time will develop anemia. I think it has been shown that rats kept on milk alone and suckling pigs kept on milk alone will develop anemia on account of lack of iron content in the milk. The amount of iron necessary for the general upkeep of the body, so far as the average food is concerned, is remarkably low. It has been shown that our American diet averages about fifteen milligrams of iron a day, yet there are instances in which diets running much lower than that have kept the individuals on very satisfactory levels so far as anemia is concerned.

A few years ago Davidson, in Edinborough, had a very interesting study of anemia. He selected two groups of people. First, he had a group of 750 children, below the age of twelve, and male adults. He made a study of their blood and at the same time made a study of the content of iron in their diets. In no instance did they have up to the amount of iron that we regard as requisite for each individual. In some instances it was less than six milligrams a day. Yet in this group of young children and male adults anemia was the exception. Then he took another group, of females ranging in age from fifty to fifty-three and he found anemia in fifty per cent of those people, coming out of the same families as the children and male adults. In one instance anemia was extremely frequent, and in the other it was of rare occurrence. His explanation is that in the female group there were what he called certain provocative factors, such as pregnancy, menstruation, lactation, the demands of the fetus, and other incidents peculiar to the female organism, that entered into the production of those anemias. So we can hardly say that the average diet, by itself, is sufficient to bring on any of these anemias unless we have that added factor which breaks down the body resistance.

Dr. Baker spoke of a type of secondary anemia which

we see in women of middle life, idiopathic hypochromic anemia. It is very remarkable in those cases that there is a persistency of the anemia even on an adequate iron diet—that is, a diet with the American ration of iron in it. They will develop anemia in spite of the mineral content. It seems there is a lack of absorption of iron from the intestinal tract in those instances, because the small amount of iron that is in the diet does not get into the blood stream. It is also apparent that where there is a lack of acid in the stomach the anemia will come on earlier and is all the more resistant to treatment. I think it has been shown that the absorption of iron from the intestinal tract, in cases where there is absence of acid in the stomach, is very much slower, and hence it is necessary to use much larger doses. Cases have been cited in which it was necessary to use five times as much iron, in order to supply an adequate amount in those cases of achylia. It has been shown, I believe, that if the iron is given in small repeated doses there is better absorption. If the iron is given immediately after a meal, when the acid content of the stomach is supposed to be at the highest point, there is reason to believe the anemia will be more rapidly overcome than if it were given some time after the meal, when the acid in the stomach is at a lower ebb.

I think Dr. Baker has brought out an important point in the handling of those anemias. Of course, those women that lack acid will seemingly have to take iron all their lives, just as those who have pernicious anemia have to take liver extract. Unless a large amount of iron is given them throughout their lives, there is a tendency for relapse, just as there is relapse in pernicious anemia when the liver extract is stopped.

Dr. Baker's paper has been a valuable contribution to the program.

DR. J. S. DEJARNETTE, Staunton: How do you give it?

DR. HIGGINS: I think, Dr. deJarnette, the iron and ammonium citrate is probably the best way. You can get granular iron and ammonium citrate and give it in powdered form or in solution. Give it about four times a day. Some cases have been reported to have been given as high as three hundred grains a day of iron without any ill effect. The old Blaud's pills are not used much now, because of the small amount of iron in them.

DR. R. H. MANSON, McKenney: I should like to ask the doctor what experience he has had in using sodium cacodylate.

DR. HIGGINS: As to the question asked about the sodium cacodylate, I think the most recent evidence is that sodium cacodylate is not a particularly efficacious drug. Even copper is not looked upon now as being as good as it was a short time ago. In this same study of Davidson's that I mentioned, they have kept the patients on a low copper content, giving them iron and eliminating all the copper possible from their diet, and those patients improved in the same way as the others. Sodium cacodylate, I think, has very little effect on the production of red blood cells.

DR. J. SHELTON HORSLEY, Richmond: It may not be particularly appropriate, because the title is " "Anemias Dependent Upon Food Deficiencies," but I wish to call attention to the anemia that simulates very closely pernicious anemia, and that comes from a slowly bleeding polyp or ulcer in the stomach or duodenum or from cancer in the right colon. It was thought at one time that some specific hemolytic toxin was elaborated by cancer in the right colon, but the anemia can be accounted for by the slow bleeding and the rapid absorption of toxic products in the right colon. I recall a recent patient, seventy-two years of age, who came into the hospital with a tentative diagnosis of pernicious anemia, in whom we found cancer in the right colon. If cases of anemia do not respond very quickly to medical measures, such as suggested by Dr. Baker and Dr. Higgins, it would be well to look for a lesion in the stomach, duodenum, or the right colon.

DR. GREER BAUGHMAN, Richmond: Just a word about the anemias of pregnancy. I am so glad Dr. Baker mentioned those. Every pregnant woman that comes into my office has her finger stuck and her hemoglobin estimated. If her hemoglobin is low, she gets a change in her diet—some form of iron or something that will make the iron get into the hemoglobin.

I think the question of making the iron stick (get into the hemoglobin), is very important. If some of these internists will tell us how to make the iron stick until it has time to get into the blood stream I shall be very grateful. If Dr. Baker will elaborate what Dr. Higgins said about that I shall be glad.

DR. BAKER, closing the discussion: I think there is very little to add. Iron and vitamins are ordinarily not considered as foods, but they are essential food elements and should be so considered. They are as much part of our food elements as meat, carbohydrate, or whatever else we may eat.

Dr. Higgins brought out, too, the fact that our foods ordinarily contain enough iron. But in these people who have hypochromic anemia, their diet has been deficient for a long number of years; for probably twenty or thirty years they have been living on a diet that is high in carbohydrates and low in meats, fresh vegetables and fruits. In addition to that, there seems to be a lowered ability to metabolize iron.

As Dr. Horsley brought out, there have been reported numerous cases of an anemia which could not be distinguished from pernicious anemia, resulting from prolonged diarrhea, cancer of the stomach, or some other gastro-intestinal disorder. In these cases there is undoubtedly an inability to absorb the essential anti-anemic factor. The anemia in such cases responds well to parenteral injections of liver extract.

Answering Dr. Baughman's question, I do not know how you can keep iron down in these people if they are vomiting, until the vomiting is controlled. Parenteral

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administration of iron is effective, but often dangerous. It is essential that much larger doses of iron be given than was formerly the custom. Sixty to ninety grains of iron and ammonium citrate daily, in three or four divided doses is probably the most satisfactory method. It is especially important to keep pregnant women from becoming anemic because babies born of anemic mothers will develop severe anemia in early life.

A NEW FRENCH CARDIOLOGICAL UNIT.

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From the practical viewpoint, even such a medical specialty as cardiology may need sub-division into several departments. For example, its didactic aspects are often quite different from those of research and require a different type of mind for their representation. Again, cardiac therapeutics, while becoming ever surer and more precisely defined, constitute another distinct division of the subject. Histology, physical diagnosis, embryology, comparative cardiac anatomy and physiology, both normal and pathological,—all these must be combined for full understanding of the heart and its mechanisms; and so many cardiological problems are still unsolved that they can be attacked only when special apparatus, technique and technicians can be applied to one doubtful point after another.

This preamble is so self-evident that it may be taken as almost a platitude. However, applications of these ideas are not unimportant. Modern hospitals and medical schools of our larger cities generally find that modern cardiology demands special laboratory facilities, preferably combined in a single unit, which it is often desirable to place in very close relation with clinical material. Results are frequently good, however, when heart cases are not segregated from other clinical conditions, though such segregation is specially useful in pediatric cardiology. There are many difficulties in associating technical study with the human relations present in actual cases of disease. Perhaps no single plan can obviate every obstacle. Some of the difficulties are related to local ideas, prejudices, customs and resources. They must therefore differ considerably even in different places in any one country, not to mention divergences occurring in different countries.

In France, the creation of a new cardiological centre has been rendered possible by conditions inherent in the hospital and teaching administrations not only of France, but, more narrowly and definitely, of Paris. For it is naturally in Paris that students, clinical material, hospital facilities and agencies for instruction are more abundant than elsewhere in France. Again, French governmental centralization renders medical administration broadly identical in Paris with that applied everywhere else in the French Republic, including the French Colonies.

In passing, it may be explained that the new cardiological centre at Versailles was created through two main influences:

First, the service organized by Vaquez at the Hôpital Saint Antoine, where were collected the records derived from his prolonged labours, became disintegrated by his assignment to another hospital (La Pitié). The service organized by Vaquez was not officially recognized as such, nor was it maintained, by the governing body known as the Assistance Publique, or public charities. This body has no special interest in the results accumulated by any physician during his connection with any hospital or hospitals to which he may be assigned. The transfer of Vaquez from the original site of his work to another hospital resulted in the association of two cardiologists at the Pitié, neglect to provide any cardiologist for the Saint Antoine hospital and the appointment of *three* gastro-enterologists to the latter. Again, Vaquez was about to retire from active work, having nearly reached the age-limit prescribed by law. Patients who had formed the habit of resorting to the Vaquez clinic for the special attention which he benevolently bestowed found this valued aid no longer at their disposal and were obliged to begin over again with persons and methods not familiar to them.

Second, Doctor Lutembacher, a student and follower of Vaquez, was well placed to organize and operate a new centre. The latter could thus largely profit by the ideas and life-work of Vaquez, constitute a special field for the labours of Lutembacher and provide a capable unit for the public. A condition stressing the necessity for a cardiological centre consists in the high mortality and increasing frequency of cardiac disease. In France, cardiac morbidity is but little below that of cancer. The deaths due to heart disease in France numbered 49,889 in 1906, and 62,014 in 1930 (Lutembacher's figures, *Le Siècle Médical,* December 15, 1933).

As with other affections, prevention is better than cure in cardiac disease. Cardiac prophylaxis refers especially to syphilis and rheumatism. While antiluetic campaigns and material means for combating syphilis have been freely provided in a broad and general way, they have not dealt distinctly with the cardiac relations of syphilis, while, at least in France, little attention has been paid hitherto to the prevention and arrest of the effects of rheumatic fever upon the heart. An effective cardiologic centre must have several departments:

1. *For Collection and Preservation of Records.*—The data are anatomical and pathological (lesions of the heart and vessels), histological, embryological, radiological, graphic (arterial, venous, capillary and cardiac tracings), kinematographic and photographic. They also include phonographic records of normal and pathological heart sounds.

2. *For Research.*—This field is unlimited. In it lie studies on muscle, blood-flow, pharmacological action, physical, chemical and bio-chemical reactions, and the physiology of the heart and circulation in man and various other animal genera and species. Research must also deal with the cardiac relations of the nervous system and with vegetable as well as animal biology (reactions in plant cells and tissues, such as those mentioned in the investigations by James Mackenzie on the hairs of Drosera).

3. *Clinical Applications.*—Here are included exact diagnosis, treatment and the effects of therapeutic agents in clinical cases. Here also must be classed bacteriological and serological tests, with reference to the effects of various infections upon the heart (syphilis, pyogenic bacteria, the agents producing "rheumatism" and the various forms of arthritis, and other bacteria whose causative relations to endocarditis, pericarditis and the vascular system are assuming increasing importance. Clinically, the action of chemical and bacterial toxins upon the myocardium and other tissues of the heart and vessels has become of great practical interest.

The functions of these three sections of the modern cardiologic centre more or less over-lap. However, the combination of the three sections in a single unit permits correlation of all facts observed, and thus permits increasingly correct interpretations.

For the formation of the French unit combining these several departments and constituting Lutembacher's workshop, a pavilion among new constructions of the local civil hospital has been set aside for this special purpose at Versailles. This pavilion, named after Potain, includes three stories and a basement. The department (generally corresponding to the American county) of Seine-et-Oise, in which Versailles is situated, combines with the central French government in providing funds for its equipment and maintenance. The centre consists of the three sections whose functions have been described above. It contains a large collection of anatomical and pathological material, slides, tracings, electrocardiograms, films and similar adjuvants. Apparatus is modern and complete. The laboratories are assembled on the ground floor and many of them can be thrown together by means of sliding partitions which normally separate them. Detailed description of the equipment appears in *La Presse Médicale,* April 4, 1934. The two upper stories of the Potain pavilion are reserved for patients. There are no general wards, but a number of large rooms contain each three or four beds, while a few rooms accommodate but a single bed. Frogs, larvae and other living experimental material are housed in the basement.

The centre is thus largely devoted to research. A thorough study of the heart in all its relations is made here. Instruction, whether under-graduate or post-graduate, forms no part of the work of this centre, though its publications are available to teachers and students. So much labour is required for technical study and research that this centre cannot undertake the training of students, advanced or otherwise. Again, it is too far from Paris to be easily accessible for the Medical School and has been deliberately planned for the single-minded purposes which have just been outlined. Its contribu-

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tions to therapeutics promise to prove of great value. This is the first hospital unit organized for the grouping and systematic treatment of cardiac cases. An experience of thirteen years has proved to the satisfaction of Lutembacher and his associates that intravenous injections of sodium salicylate are harmless and effective in the treatment of acute rheumatism. He has himself given more than 5,000 such injections, with no accidents and excellent results. With operators of sufficient skill, a patient may receive from 200 to 300 intravenous injections of salicylate without production of venous sclerosis.

About one kilogram, or over two pounds, of salicylate is injected intravenously per month at this new centre. The solution employed is a 1 to 20 one, containing the salicylates of sodium, potassium and calcium in the proportions in which these metallic ions occur respectively in Ringer's solution. Solutions of 1 to 10 are not employed. Injections are given well between meals. The necessary needles are very fine, and great care must always be observed not to permit the injected solution to escape outside the vein. This treatment is inapplicable in the presence of cardiac thrombosis, on account of its possibility of precipitating embolism.

The intravenous salicylic treatment thus described should be applied as early as possible, even in the mildest forms of acute rheumatic fever. It is claimed to be the best method for securing complete cure of the rheumatic disease and for preventing injury to the heart. Hospitalization is necessary for cases requiring two injections per day. If a single daily injection suffice, the patient can come as an out-patient every morning for his treatment.

Paris, 10 bis rue Herran.

MEDICAL AND SURGICAL DIATHERMY.*

P. D. STOUT, M. D.,
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(Thomas A. Edison--the wizard; electricity—dachshund).

Differentiate:

MEDICAL DIATHERMY, a "heating through," is the application of high frequency electric heat to any part of the body, under controlled conditions, by means of two metal electrodes, placed opposite each other, on the areas to be treated, without electric shock or danger of death to the organism.

SURGICAL DIATHERMY is the application of high frequency electric currents for the destruction and removal of diseased tissue or for cutting through normal tissues with diminished bleeding.

The development of diathermy is the outcome of the gratuitous cooperative labors of a group of physicists, chemists, and medical and surgical investigators, to all of whom grateful acknowledgments are due.

HISTORY OF ELECTRICITY AS A THERAPEUTIC AGENT

Advances made were often simultaneous and independent in widely-separated areas, making it, therefore, difficult at times to assign priority in the construction of apparatuses and improvements in technic.

The history of this new art is not merely a chronological recitation of the various events and discoveries from a century and more ago: the citations are given to instruct the student in the development from the earliest simple efforts, step by step down to our present-day attainments. The result of such a procedure is to bring about a far better comprehension of a somewhat difficult matter, a real grasp of the subject. The recognition of the claims of the pioneers in the field of electrotherapeutics is also payment of a just debt to their honored memories, while the very act makes for a culture not attainable by him who neglects it.

It is interesting to note that William Gilbert (1540-1603), physician to Queen Elizabeth, made memorable experiments in magnetism and electricity, from which he derived the term *electricity*—taken from the Greek, electron, meaning amber. It is upon him that Krusen bestows the title "father of electrotherapy." To the honored name of Gilbert we acknowledge the first published work in 1600 on magnetism—De Magnete—the first scientific treatise based on the experimental method to be printed in England. Coincident with the publication of this great work, Gilbert was honored with

*Read before the Southwestern Virginia Medical Society, at Radford, Va., September 21, 1934.

the presidency of the Royal College of Physicians.

At the very outset of his studies, Gilbert found Jerome Cardan (1501-1576) boldly asserting that a wound made by a magnetized needle is painless, when, as Gilbert so clearly states, Cardan had only to prick his finger in order to ascertain the truth or falsity of the observation.

Gilbert's De Magnete (1600) and William Harvey's De Moto Cordis (1628), in the light of later comparative studies, established a new high-water mark in the development of science and the methods of investigation. On account of the lack of scientific intelligence on the part of the English-speaking public at the time Gilbert published his De Magnete, there was a peremptory lull in the progress of electrotherapy in England. Walter Charleton (1619-1707), who was probably fairly representative of the scientific intelligence of the period, did much to dampen the ardor in the field of electro-scientific research, due perhaps more to his lack of understanding or appreciation of Gilbert's observations, than to any contributions he produced himself, either in thought or action, to help the cause along.

Gilbert's publications had been more favorably received in Italy, and students were flocking from all over the world, seeking admission to such universities as Padua, Bologna, Pisa, Pavia, etc., where medicine, mathematics and the physical sciences were receiving the greatest emphasis. At the time of the publication of Gilbert's De Magnete, the immortal William Harvey (1578-1657) was a student at Padua, which circumstance did much to link two great nations together in the field of scientific research (Great Britain and Italy). It was about the year 1592 that Galileo had been called from Pisa to Padua, where he became known as the most brilliant and stimulating teacher of natural philosophy of the day. He taught the methods of experiments and inculcated in his students habits of independent thinking.

Copies of Gilbert's De Magnete reached Padua in the midst of Harvey's student career, and it must have been with glowing enthusiasm that faculty and students alike read in Gilbert's "Preface to the Candid Reader," "* * * in the discovery of the secret things, in the investigation of the hidden causes, stronger reasons are obtained from sure experiments and demonstrated arguments than from probable conjectures and opinions of philosophical speculators of the common sort."

Sir Thomas Browne (1605-1682), the literary physician of Norwich (born three years after Harvey had won his degree from Padua, and two years after the death of Gilbert), was the first to use the noun "electricity." In his Pseudodoxia Epidemica, he says:

> "Again, the concretion of ice will not endure a dry attrition without liquation; for if it be rubbed long with a cloth it melteth, but Crystal will calify unto electricity. * * * but if gently warmed at the fire and wiped with a dry cloth, they will better discover their Electricities."

Sir Thomas Browne was the first to use the plural of electricity.

> "The science of electricity, as must be generally known, originated after the establishment of The Royal Society; almost every early electrical discovery of importance was made by its members, and is to be found recorded in the PHILOSOPHICAL TRANSACTIONS of the Society."

We owe a great deal of honor and praise to the Royal Society—which was the Oxford and Cambridge groups working jointly for the promotion of "Physico-Mathematical Experimental Learning." First record of their minutes is dated November 28, 1660. The Royal Society was composed of such personages as Dr. John Wallis, Mr. Theodore Haak, Dr. Jonathan Goddard, Dr. Seth Ward, Dr. Ralph Bathurst, Dr. William Petty, Sir Christopher Wren, and the like. In 1663, a year after the incorporation of the Royal Society, the study of electrical science received great impetus through the invention of a friction machine for the production of static electricity. This was the work of Otto von Guericke (1602-1686). The first practical static machine that could be used or operated with ease was that devised by Francis Hauksbee, who, in 1706, employed a glass ball that could be rapidly revolved by means of a crank. Friction was applied by hand, and a collector was provided by means of a brass chain. Improvements were later made, and Jessee Ramsden (1735-1800), an English optician and manufacturer of mechanical instruments, in 1768, devised the glass plates used today.

Subsequent to the death of Hauksbee, fundamental discoveries in the science of electricity lagged until 1729, when Stephen Gray (1696-1736) clearly differentiated between conductors and non-conductors. He showed that a static charge could be conveyed to another body or substance, giving to that body or substance the same properties of attracting

or repelling, and that these properties could be carried to other bodies many hundred feet away over metallic wires and wet strings.

The development of the Leyden jar, an apparatus for the accumulation of static charges, played an important role in the application of electricity to disease. Until the invention of this form of condenser, static charges from the then-developed machines were relatively mild, and the physiological effects scarcely observable. This brings us up to 1743, near the middle of the 18th century, and students were propounding questions: "What possible use can electricity have?" Kruger delivered an address in response to these questions to his students, in which he said (with doubtful logic) that if electricity must have some practical use, it was certain that none had been found in theology or jurisprudence, and, therefore, where else could it be used except in medicine. He urged his students to investigate. He told them he had heard that electrified bodies did not readily decay, but said that experiments must determine whether electricity would prevent decay and wasting in the human frame. He demonstrated that powerful electrical charges caused blisters on the skin. He reasoned, therefore, that these charges traveled through the entire body and caused changes in remote parts. He stated that it was possible that electrification of the body would increase the circulation of the blood and that, while practically nothing was known about what electricity did, it seemed to him certain that body changes would occur.

To detail the many events, discoveries and experiments that followed through many years of electrotherapeutics, might render this treatise unworthy of consideration, so, in order to cover the ground, and as briefly as possible, I shall attempt from this point merely to refer to what took place in electrotherapy from the middle of the 18th century, down to the past few years, other than to say that Christain Gottleib Kratzenstein, in 1744, was the first man to apply electricity to the human body, and test its physiologic effects. He made the observation that the pulse increased several beats a minute following the application of the static spark, and Joseph Priestly reports in his "History and Present State of Electricity" that in fifteen minutes Kratzenstein cured a woman of contracted little finger; and that by one electrification he had so far relieved a person who had two lame fingers and that the patient could now play the harpsicord.

Alfred Charles Garrett (1813-1891), of Boston, was the first American to publish a comprehensive treatise on the use of electricity in the treatment of disease.

The middle of the 18th century marked the beginning of a general interest in the therapeutic use of electricity, Benjamin Franklin playing an important role in the promotion of electro-therapy by his valuable discoveries and unusual understanding of electric forces, electric apparatuses, etc. So important was Franklin and so valuable his discoveries, he was referred to as "Doctor" Franklin. Articles written about him often referred to him as: Benjamin Franklin, "M. D." He was often called upon to administer electric treatments for the relief of disease in Philadelphia and New York. Franklin had a wide acquaintance among physicians and acquired a knowledge of medicine of his day superior to that of the average practitioner.

In this discussion, I have attempted to show that electrotherapy has had a contemptuous as well as a tempestuous struggle to meet and overcome the criticisms of unbelievers; some of the criticisms have been more or less cantankerous. Some of the worst criticisms, which is an aphorism, come from those individuals that know little or nothing about electrotherapy, and have attempted by their unbelief to discredit the wise experimenters and discoverers. In the writer's own experience, unfavorable criticisms, coming from those probably less in position to discuss electrotherapy than the writer, have done much to thwart his success in this vicinity.

Today, electrotherapy has fully found itself in the works of the moderns, such as Oudin, d'Arsonval, Telsa, Galvani, etc., many of the high frequency currents taking the name of the experimenters and discoverers of different currents. The person now that shows an aversion or a lack of appreciation of electricity in medicine is looked upon by those having had experience as a non-progressive or out-of-date individual.

Finley R. Cook, of New York, while using a static machine for medical treatments, accidentally short-circuited the current to his finger with distinct destruction of tissue. From this small event, he got the idea of a new therapeutic agent, and began to treat small skin tumors, warts, moles, scars, facial blemishes, acne pustules, boils, infected tonsils,

hemorrhoids, etc., with marked success. Unaware of the European work, he reported his results in the *Medical Journal and Record* in 1906 and 1907.

Kinds of high frequency currents now in use for therapeutic purposes are:

1. Electrodesiccation — dehydration or drying current.
2. Electrocoagulation current—a cooking or heating without carbonization or charring of tissues.
3. Acusection—a cutting current with diminished bleeding.
4. Galvanic current—a chemical current in its effect, with positive and negative poles.
5. Sinusoidal currents—exercising or stimulating currents.
6. Faradic current—shocking current, practically replaced or abandoned for some of the foregoing currents on account of its shocking effect.

These currents are possibly the result of long, drawnout study and experimentation by the whole field of physicists, chemists and medical profession. It is absurd to state that electricity is a "cure-all," and no one holds to any such claim who is well-informed in the use of electricity as a therapeutic agent.

Eberhardt states in his Manual of Electrotherapeutics that electricity is not a "cure-all," but further states that we can do some things better with electricity than by any other means; in still other conditions, electricity does as much good as any other method of treatment; in still other conditions, electricity has little or no effect whatever. For example, stone in the urinary bladder and syphilis are two conditions not claimed to be affected by electricity, yet electricity in no way interferes with the prescribed treatment when other methods of treatment are employed, but does, in fact, enhance the effect of certain medicinal remedies that are employed along with and in conjunction with electricity, by hastening their assimilation and disassimilation through and out of the body or system respectively. Eberhardt had no intention, as one can well surmise from a study of the foregoing statement, of deviating from the truth.

Hypertension, particularly of the functional type, may be relieved by auto-condensation—another use of electricity as a therapeutic agent—perhaps temporarily, yes; even so, can we say that any of our medicinals or other means of blood pressure reduction shall be permanent in their effect! Just another objection coming from skeptics, in order to be counted among the critical, conservative group of therapists caveling about that which they know very little. A combination of diet, medicinals and auto-condensation is our sheet-anchor in lowering hypertension of the functional type.

In rheumatic affections, painful or injured joints, electricity does much, when properly applied, to dispel the pain and suffering and restore the parts to normal function. In some instances in the writer's own personal experience, gratifying results have been had with conditions of this character. The very fact that patients come back for more is some proof of its efficacy. In routing the pains and suffering of pelvic inflammatory diseases, particularly in women, more especially in puerperal sepsis, diathermy and other methods of heat application and stimulation by ionization, do much towards the relief and even cure of a great number of these infections, thereby avoiding operations in some instances.

Gonorrhoea can be treated, and the writer has cured this disease, with the abandonment of practically all other treatment, in the only patient he has treated for gonorrhoea in the female by this newer method, but it took considerable time by the method employed, approximately thirty days, to effect a cure. Cures are hastened, and patients are relieved of their suffering much sooner, it is said, by supplementing diathermy with 2 per cent zinc sulphate solution by the ionization method with Galvanism; it then requires but seven or eight treatments to effect a cure. It is claimed if the local temperature can be raised to and maintained at 106-108 degrees F. in the pelvic organs, gonorrhoea in the female, as well as the male, can be cured in five hours—that all gonococci may be killed. My treatments were of thirty minutes duration, given practically every day. At the same time the writer treated the woman patient, he treated the husband, the offender, and he, too, was cured in a similar time limit as his wife. No gonococci could be demonstrated by smear at the discontinuance of the treatments, and there has been no recurrence of the disease in either patient. The treatments are rather tedious, time consuming and expensive. It cost this family approximately $150.00 to get cured of their trouble by means of diathermy.

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The pains of pleurisy and pneumonia are appreciably relieved by treatments with diathermy, and the literature is rife with instances where relief was paramount. Recovery was unquestionably hastened and the mortality lessened in these conditions. Methods of treatment are often referred to in the lay press as "Dr. Heat." Heat has done much to minimize the suffering from disease, and when heat is indicated, diathermy, when available, has no superior as a means of relief of pain.

In treating benign and malignant lesions about the face, head, lips, mouth, tongue, throat, where bleeding is a complicating factor, high frequency currents have practically replaced other methods of treatment in these areas, when the physician is equipped and trained to use them. Bass, of Durham, N. C., states in his article, High Frequency Currents in the Treatment of Cancerous Lesions about the Face, Head, Mouth, Lips, Tongue and Throat, that: "High frequency curernts have the unique quality of distorting and destroying embryonic malignant cells lurking in the tissues well beyond the lesion treated, and, by so doing, obviate metastases by avoiding too much handling of the tissues by classical surgery," meaning, however, said he not to detract from any satisfactory method of treating cancerous conditions in these areas, but to establish the superiority of high frequency currents.

Diseased conditions treatable and benefited by diathermy are too numerous to go into detail concerning them or the methods of treatment, but I do want to place a little special emphasis upon the question of electrocoagulation of tonsils.

The literature is becoming voluminous with articles on the subject of electrocoagulation of tonsils. While there are those who oppose the method, it is generally conceded by practically all those having had sufficient experience with the newer method of tonsil removal, that diathermy is a valuable adjunct in the extirpation of tonsils.

In reviewing several articles published on the subject by the Consulting Bureau of W. F. Prior Co., Inc., of Hagerstown, Md., articles of seven different authorities from this source of information were more or less in accord, with but a single exception. John J. Gurtov did not exactly believe in the method, his reason being that he could do surgical tonsillectomies on the aged and infirm, arthritic and serious cardiac patients, under local anesthesia, without surgical shock. Unfortunately many oral surgeons or specialists are not so adept in the surgical removal of tonsils. Those who claim to be able to remove tonsils surgically, without surgical shock, should have their own tonsils removed by that method by one claiming to be able to do it without surgical shock, under local anesthesia.

Seeing is believing, and apparently, the other six authors favoring electrocoagulation thought very differently. Electrocoagulation of tonsils is as difficult to learn expertly as the game of golf, and few there be who master it. One should do at least 200 successful electrocoagulations of tonsils to be considered an expert.

From Hollander's article, Electrosurgical Tonsillectomy, quoting: "During the past six years, the author has performed over 200 tonsillectomies by electrocoagulation. When an equal number of surgical removals are compared with those done by electrosurgery, certain definite observations stand out:

"1. For local surgical tonsillectomy, infiltration of novocaine gave an adequate painless field for operation. Infiltration anesthesia proved unsatisfactory for the electrosurgical procedure because the waterlogging of the tissues added greatly to the severity of the local reaction. Topical applications of cocaine solutions was not sufficient to insure against pain in electrocoagulation treatments. When topical anesthesia was employed, the severe local reaction which followed infiltration anesthesia was absent with electrosurgery.

"2. The local reaction of surgical removal was in most instances less than that of electrosurgery when infiltration of novocaine was employed. The local reaction from electrosurgery was always less with topical anesthesia than with surgery with infiltration.

"3. The period of convalescence from surgical tonsillectomy varied from two to ten days, with an average of absence from occupational duties of three days. When fractional electrocoagulation was used, the patients attended their usual duties each day, and only in a few instances were unable to partake of their regular meals.

"4. Hospitalization was routine with the surgical removals, while the office served for the electrosurgical method.

"5. In the surgical tonsillectomies, no secondary

hemorrhages were encountered, and in only one instance was there severe hemorrhage at the time of the operation. No primary or secondary hemorrhages occurred in my series of electrosurgical removals.

"6. There were no unusual complications from either the surgical or the electrosurgical method."

Such a report as outlined by Hollander is substantial proof of a well-groomed or skilled operator. Hollander did not report his percentage of post-operative tonsillar remains in his series. Rhodes and Dick report, in their routine physical examination of nurses entering training in the Cook County and Presbyterian Hospitals, in Chicago, the incomplete removal of 294 out of 403, who had had their tonsils removed surgically, or a failure of 73 per cent. The remaining tonsillar tissue was found to contain more pathogenic bacteria than the tonsil in its state prior to removal. Further, the conditions from which these student nurses primarily had their tonsils removed did not improve until the recurrent tissue was removed. These cases were finally treated by means of electrocoagulation, or electrosurgery, with gratifying results.

This statistical report further states that 73 per cent failures with surgical tonsillectomy is too high for efficient operators, but goes on to venture the assertion that one has only to witness a few tonsil operations to be convinced that the figure as stated above has not been exaggerated. It must be remembered, however, that very few of these cases were operated upon by the same surgeon, for these patients or student nurses came from practically every state in the Union.

INDICATIONS FOR ELECTROCOAGULATION REMOVAL OF TONSILS ARE

1. An outstanding indication for electrosurgical tonsillectomy is hemophilia. The physician hesitates to remove the tonsils of a patient with anemia or true hemophilia, or one with delayed clotting time from any cause. This rule applies also, but to a lesser degree, to cardiac patients. While surgery can be performed successfully in a large percentage of the latter, a substitute method is more desirable, especially so if surgical shock is to be avoided.

2. Other indications are tuberculosis, hypertension, nephritis, post-operative tonsillar remains, tabs, or tonsil stumps, lymphoid hypertrophy, the aged and infirm. Every article one reads nowadays on the subject of electrosurgical removal of tonsils, concedes that diathermy is the ideal or method par excellence for the removal of post-operative tonsillar-remains from any cause. In the writer's personal experience, he has seen and treated patients that had had as many as three surgical attempts at removal of his or her tonsils, and still there was present sufficient tonsil tissue, or lymphoid hypertrophy, to require as many as two electrocoagulation treatments to free the fossae of debris, etc. To use other than the electric needle in these cases, one is insistent upon converting a simple procedure into a major or minor tragedy again and again. The writer has treated more than 250 tonsil patients by means of electrocoagulation, with approximately 2,000 individual treatments, with satisfactory results, except in those cases where advice had been sought elsewhere concerning the newer method of treatment, etc. In these cases, results have been doubly bad for several reasons:

First, when a patient seeks advice elsewhere and meets with unfavorable, unwitted criticisms, he ceases to cooperate in many instances, and, by so doing, avoids payment of the fee, leaving a job incompleted.

Second, after the tonsils are practically all removed, or well onto being entirely or completely removed, in many instances the writer has had patients return and tell him different tales of woe from "Dr. so and so" who tells him that his tonsils are not "out" and should be "cut-out," etc. Not infrequently, however, some patients meet with more favorable suggestions, and are encouraged to follow the advice of the doctor who is doing the work, as "he probably knows more about the method than I do." Complete removal of the tonsils is recommended, and one should not be satisfied until this is done for best results. Unwitted criticism has done much to thwart success, for many patients would have carried out his or her part of the agreement had they not been interfered with. Waring, of Cincinnati, reports just such an experience, and, in spite of this, he is favorable to the newer method, in the face of an extensive ear, eye, nose and throat practice.

In spite of the ever growing enthusiasm for this newer method of removing tonsils, there are numerous disadvantages. One of these is the special study required to learn the method. The cost is practically prohibitive. Due to the apparent sim-

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plicity of the procedure, physicians may attempt electrocoagulation of tonsils without adequate training and experience and secure bad results. Diathermy, incorrectly employed, can produce the same mutilation of normal structures as poor surgery. Another disadvantage is, diathermy or electrosurgical removal of tonsils in children is not practical, because children cannot cooperate. Ether has to be used with them, of course, and then taken away, but, by attaching the current from a high frequency apparatus to any of the instruments, much better results may be obtained, if it is claimed, for there will be less or no bleeding and much more prompt healing. High frequency currents may be attached to any of the instruments, such as the Sluder or snare, according to Howard Kelly and Grant E. Ward, of Johns Hopkins and the University of Maryland, respectively. One can easily use poor judgment in the selection of his cases, and bad results and poor cooperation may then be expected. The very nervous patient is not a good subject for electrosurgical tonsillectomy.

In four years experience, not the slightest tendency to tonsil recurrence has been seen by the writer or reported by any authority.

Balmer reports improvement in the patient's general health during the treatments by electrocoagulation removal of tonsils, and one doing electrocoagulation of tonsils will not infrequently have this experience. The explanation for it is the sterilizing effect of the current on the diseased tonsil tissue, with the removal of a certain amount, by drainage, of the toxic material, the cessation of toxic absorption being no doubt a factor. In addition to this, it is believed, and taught, that the coagulated tonsillar tissue that remains *in situ* for eight to ten days following each treatment (treatments are usually given two weeks apart) acts similarly to the injection of an autogenous vaccine or protein. The products of protein decomposition from the electrically killed bacteria and tissue elements are continuously absorbed by the vascular and lymphatic systems, causing a defense reaction to ensue in the organism. This has undoubtedly been the experience of every physician who properly employed electrocoagulation, for it does occur, and often on the same day treatments are begun.

In the removal or eradication of hemorrhoids by hydrolysis, a chemical current or Galvanism, limited in the writer's hands, to five patients, results have been equal in outcome to the results reported or claimed by the masters in this field. Prompt relief of congestion and pain were noticeable as an early response to treatment, often experienced before the patient left the office, with final recovery. Occasionally it seems that tonic contraction of the sphincter and levator muscles occurs, this effect being interpreted by those unfamiliar with this method of treatment as stricture formation. Dilating or stretching these muscles, or the lapse of a little time, will cure this unimportant complication. Except for the discomfort it affords, this complication need not be reckoned with.

Hydrolysis or Galvanism still remains the only safe depilatory for the removal of superfluous hair from the faces of fastidious women. My experience with this method of hair removal has been attended with good results, with essentially no scarring and with practically 100 per cent cosmetic effect. It requires, however, some special knowledge, a steady hand, and good eyes to do this class of work.

With acusection—surgical cutting current—the writer has had no actual experience, but it is taught by Kelly and Ward that this adds much to be desired to the orthodox surgeons armamentarium. Kelly and Ward have made valuable contributions to the knowledge of electrosurgery, and have made possible certain operative procedures in some pathological conditions that had hitherto been considered inoperable.

To remove electricity from the armamentarium of the medical and surgical practitioners would mean the ruination of many of our best physicians and surgeons. The Roentgen ray, transillumination-diagnostic apparatus, cystoscopes, high frequency currents, electric cauteries, electrocardiographs, etc., would be of no further use.

Waves of interest in electrosurgery, amounting to enthusiasm in some quarters, followed each important discovery of new properties of electricity. Hope following disappointment may fairly be likened to a *sine curve* of medical interest as we view the period of Otto von Guericke to the beginning of the 20th century. There has been so steady an advance in our knowledge of the effects of the various forms of electricity upon the tissues of the living organism, that it may be confidently assumed that physiologically measured results will stand the test of time. The method of experiment of William Gilbert, with ever growing power to measure physio-

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logic response, has replaced slavish reliance upon clinical data, and, as a result, numerous electrotherapeutic principles of the greatest importance have been developed.

Workers in this field must continue their researches, focusing upon electrotherapeutic problems the clear thinking of a group of biologists, physicists, chemists and clinicians of high order.

Reynolds Arcade Building.

Woman's Auxiliary to the Medical Society of Va.

President—MRS. JOSEPH BEAR, 3012 Monument Ave., Richmond.
President-elect—MRS. FLETCHER J. WRIGHT, Petersburg.
Recording Secretary—MRS. JAMES B. STONE, 2042 Park Ave., Richmond.
Corresponding Secretary—MRS. AMBROSE MCGEE, 4107 Kensington Ave., Richmond.
Treasurer—MRS. REUBEN F. SIMMS, 2034 Park Ave., Richmond.

An Invitation to the Norfolk Meeting.

The Annual Meeting of the Woman's Auxiliary to the Medical Society of Virginia will be held in Norfolk, October 15th to 17th.

A cordial invitation is extended to each and every woman member of the doctors' families to attend this meeting.

The committee is anticipating with great pleasure your coming to Norfolk. An interesting program is being planned, and everything possible will be done to make your visit enjoyable.

If you have never attended a meeting of the Auxiliary, you can not realize the pleasure obtained from contact with the splendid women who are the officers and members of the Virginia Auxiliary.

The program for the Norfolk meeting includes a "Bring Your Husband" Reception on Wednesday evening, October 16th, honoring the President of the Medical Society of Virginia, Dr. Frank Smith and Mrs. Smith of Abingdon, Va.; the President of the Auxiliary to the Medical Society of Virginia, Mrs. Joseph Bear of Richmond; and officers of the Auxiliaries to the American Medical Association and the Southern Medical Association.

It is hoped that you will accept the invitation to meet these guests. We know that your presence will greatly benefit the meeting, and we feel assured that you will return home with renewed inspiration.

Most Cordially,

MRS. EUGENE LOWENBERG, *President,*
MRS. SOUTHGATE LEIGH, *Chairman,*
Woman's Auxiliary to Norfolk County Medical Society.

Auxiliary to the Princess Anne County Medical Society.

Last spring a group of physicians' wives of Virginia Beach organized as an Auxiliary to the Princess Anne County Medical Society. Already these women have launched a most noteworthy piece of work—a campaign to persuade the members of the Princess Anne County Board of Supervisors that hospitalization for the county indigent is necessary. They sent letters to officials of all civic organizations in the county, to pastors of various churches, and to others who might be interested, stating the need for such hospitalization and urged all to pledge the aid and support of their organization to the cause. Recently the Board of Supervisors appropriated six hundred dollars to cover a period of six months for this work.

Mrs. R. W. Woodhouse, of Virginia Beach, is president of this Auxiliary.

In behalf of the State Auxiliary, I extend this unit a most hearty welcome and commend them on their splendid achievement.

(MRS. JOSEPH) KATE C. BEAR, *President,*
Woman's Auxiliary, Medical Society of Virginia.

Auxiliary to the Mid-Tidewater Medical Society.

The July meeting of this Auxiliary was held on the lawn of the Country Club at Gloucester Court House and members were welcomed by Mrs. James W. Smith of that county. The meeting was called to order by the president, Mrs. Hawes Campbell, of Enfield.

August was decided upon as the month to launch a campaign in the interest of *Hygeia* and each member was urged to get at least one new subscriber. The loan closet was also presented and other counties urged to found one as has been done in King William.

Mrs. Bear and Mrs. Simms, of the State Auxiliary, were guests and gave full and interesting reports of the National meeting at Atlantic City.

Mrs. James W. Smith was appointed delegate to

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the State meeting in Norfolk, after which the members were entertained at lunch by the doctors of the county.

In the afternoon a tea was tendered the ladies at White Marsh, the beautiful estate of Mr. H. Baruch.

The James City-New Kent County Auxiliary

Recently met at the home of Mrs. J. R. Tucker, Williamsburg, for its bi-monthly meeting. Seven were present.

After a brief business meeting, Mrs. Tucker gave us a very interesting paper on "The Importance of Milk in our Diet" and a short sketch of the life of "Jane Todd Crawford."

The hostess served delicious refreshments, after which we adjourned to meet with Mrs. T. B. Henderson in September.

MRS. L. V. HENDERSON, *Reporter.*

Public Health Statistics

I. C. RIGGIN, M. D.
State Health Commissioner of Virginia

The communicable disease reports received at the office of Dr. G. F. McGinnes, State Epidemiologist, during the month of June, 1935, show the following cases compared with the same month in 1934:

	1935	*1934*
Typhoid and Paratyphoid Fever	106	123
Diphtheria	37	47
Scarlet Fever	51	71
Measles	211	619
Meningitis	14	4
Poliomyelitis	246	4
Rocky Mountain Spotted Fever	11	12
Typhus Fever	2	1
Undulant Fever	2	1
Tularaemia	4	1
Smallpox	1	0

DIPHTHERIA

Now is the time to immunize against diphtheria. The last two weeks in October and the first week in November is the period of highest incidence of this disease in Virginia and no child should be allowed to go through this season without being protected. Since immunization against diphtheria is so easy to acquire, it is unnecessary to run the risk of being ill and even dying from this disease. Particularly does this apply to children of pre-school age. In 1933 nearly 40 per cent of all cases and 76.5 per cent of deaths from diphtheria in Virginia were in children under six years of age.

In a study of several thousand children it has been shown that in the pre-school age less than 50 per cent of the children are naturally immune to diphtheria. With increasing age, the percentage of naturally immune increases gradually up to ten or twelve years and from then on about 64 per cent show natural immunity.

Education of the population as to the value of diphtheria immunization must continue and be extended in spite of the accomplishments already made in this direction. For example, in Syracuse, New York, 667 families in which there were children without diphtheria protection were interviewed. It was found that 75 or 11 per cent of the heads of these families had not had their children protected because they did not realize the necessity for protection nor how easily it could be had.

A recent study in Virginia showed that one dose of Alum Precipitated Toxoid will produce immunity within six weeks in over 90 per cent of the children. Moreover, studies thus far show that the immunity from Alum Precipitated Toxoid continues in over 90 per cent of the cases for at least one year and it is anticipated that this immunity will last through the dangerous period of childhood.

Each physician should make it his responsibility to see that every child in his practice is immunized against diphtheria. Babies six months or more old should be given one dose of Alum Precipitated Toxoid. Children entering school this fall should be Schick tested and if found positive treated with toxoid.

For the past three years there have been roughly two thousand cases of diphtheria annually in Virginia. Each year there is a new non-immune population. If efforts to immunize are relaxed and the number of susceptibles is allowed to increase the morbidity rate from diphtheria is bound to be higher. Therefore, immunization must continue to keep diphtheria at its present level and to make it still lower. One dose of Alum Precipitated Toxoid per child is all that is necessary.

NOTE: Toxoid is available at the office of the State Health Department.

Truth About Medicine

NEW AND NONOFFICIAL REMEDIES

The following products have been accepted by the Council on Pharmacy and Chemistry of the American

Medical Association for inclusion in New and Nonofficial Remedies:

Polyanaerobic Antitoxin (Tetanus—Gas—Gangrene) Refined and Concentrated (U. S. S. P. Co.).—An anaerobic antitoxin preparation (New and Nonofficial Remedies, 1935, p. 366) prepared by immunizing horses with the toxins of B. tetani, B. perfringens (B. welchii) and vibrion septique. When trial bleedings indicate that the potency is sufficiently high, the horses are bled into anticoagulent and the plasma concentrated and refined by methods according to the Park-Banzhaf process. It is marketed in packages of one syringe, one prophylactic dose. U. S. Standard Products Co., Woodworth, Wis.

Aminoacetic Acid—Merck.—A brand of aminoacetic acid—N. N. R. (J. A. M. A., April 6, 1935, p. 1241.) Merck & Co., Inc., Rahway, N. J.

Antipneumococcic Serum (Felton) Types I and II Refined and Concentrated.—An antipneumococcic serum (New and Nonofficial Remedies, 1935, p. 377) prepared by immunizing horses against highly virulent but dead cultures of Diplococcus pneumoniae isolated from lobar pneumonia. The product is refined and concentrated by a method devised by Dr. L. D. Felton. It is marketed in packages of one vial with syringe attachment containing 10,000 Felton units each of types I and II pneumococcus antibodies, and in packages of one vial containing 20,000 Felton units. Parke, Davis & Co., Detroit.

Refined Diphtheria Toxoid, Alum Precipitated—Squibb. This preparation (New and Nonofficial Remedies, 1935, p. 397) is also marketed in packages of one 1 c.c. vial, in packages of ten 1 c.c. vials and in packages of one 10 c.c. vial, representing one, ten and ten immunizing doses, respectfully. E. R. Squibb & Sons, New York.

Ampul Solution of Dextrose, 10 Gm., 20 c.c.—Each ampule contains dextrose C. P. anhydrous (New and Nonofficial Remedies, 1935, p. 280) 10 Gm. in distilled water to make 20 c.c. The National Drug Co., Philadelphia.

Ampul Solution of Dextrose, 25 Gm., 50 c.c.—Each ampule contains dextrose C. P. anhydrous (New and Nonofficial Remedies, 1935, p. 280) 25 Gm. in distilled water to make 50 c.c. The National Drug Company, Philadelphia.

Ampul-Vial Solution of Dextrose, 25 Gm., 50 c.c.—Each ampule-vial contains dextrose C. P. anhydrous (New and Nonofficial Remedies, 1935, p. 280) 25 Gm. in distilled water to make 50 c.c. The National Drug Company, Philadelphia.

Ampul-Vial Solution of Dextrose, 50 Gm., 100 c.c.—Each ampule-vial contains dextrose C. P. anhydrous (New and Nonofficial Remedies, 1935, p. 280) 50 Gm. in distilled water to make 100 c.c. The National Drug Company, Philadelphia. (J. A. M. A., July 13, 1935, p. 119.)

PROPAGANDA FOR REFORM

Dinitrophenol and Cataract.—Reports have been received of several cases in which cataract seems to have occurred almost in the form of a malignant development in persons who had been taking dinitrophenol for long periods of time. The coincidence is of interest regardless of whether or not it may be established that the disturbance arose because of the dinitrophenol or because of some other undetected cause. The possible occurrence of toxic contaminants in preparations of dinitrophenol must be considered. The possibility also exists that the cataracts may have resulted from associated malnutrition and an unbalanced diet. Warnings have appeared in *The Journal* from time to time concerning the dangers of uncontrolled use of new preparations of this type. The incident here recited serves as a further warning against use of these products until the actual merits and dangers may be more definitely determined. (J. A. M. A., July 13, 1935, p. 124.)

Book Announcements

Surgery of a General Practice. By ARTHUR E. HERTZLER, M. D., Chief Surgeon, Halstead Hospital; Professor of Surgery, University of Kansas. And VICTOR E. CHESKY, M. D., Chief Resident Surgeon, Halstead Hospital. St. Louis. The C. V. Mosby Company. 1934. Octavo of 602 pages. With 472 Illustrations. Cloth. Price, $10.00.

The present volume is based on Hertzler's "Minor Surgery" which appeared in 1930. In the preface to "Surgery of a General Practice" the authors state, "There is much lamentation over the passing of the general practitioner, yet the whole medical machinery is designed to make his existence impossible . . . the public demand is for services at a minimum cost. . . . It has been our aim to reduce treatment to its simplest terms, recommending time-tried measures, and only one." This aim has been realized and the result is a very practical and highly readable volume which should be of real value to every general practitioner.

Unlike many books on similar subjects the authors have not gone beyond the scope of the title to include unrelated or faddish subjects. A few omissions are noticeable. No mention is made of the tannic acid treatment in burns, or the use of antitoxin in gas gangrene. Despite these, and other minor omissions, and a rather cavalier treatment of transfusions and intravenous injections generally, a sense of balance is maintained throughout and their common-sense approach to commonplace conditions is refreshing.

The senior author's famed humor enlivens many pages, and the illustrations are uniformly good. The volume is well indexed.

HARRY J. WARTHEN.

XUM

Objective and Experimental Psychiatry. By D. EWEN CAMERON, M. B., Ch. B. (Glas.), D. P. M. (Lond.) Physician in Charge, Reception Service, Provincial Mental Hospital, Brandon, Man.; Formerly Assistant Physician, Glasgow Royal Mental Hospital, etc. New York. The Macmillan Company. 1935. Octavo of 271-vii pages. Cloth. Price, $3.00.

We might start with the premises that no present-day book on psychiatry is entirely satisfactory. This is due to the almost daily change of views which is taking place regarding psychiatry. Dr. Cameron's book for the first fifty pages is largely defensive and pooh-poohs both the observational and projectional methods of etiology and therapy. He minimizes the value of the patient's concept of his own condition and of the factor of psychic pain and stresses the objective and experimental methods, although admitting that these methods are frequently not very conclusive. He reviews most extensively the study of experimental methods and quotes the literature bearing upon these methods. American experimentors are very freely quoted, especially Cobb, Lennox, Trentszch, Pollock, Hoskins and Freeman. By far the best chapter in the book is the one devoted to conditioned reflexes in which he gives a very clear explanation of Pavlov's and Bechterev's ideas on conditioned reflexes. He then applies these ideas to emotions and psychoses. The book is well written and is especially useful as a reference book for medical literature bearing on the various subjects. The reviewer, however, cannot but feel that observation and projection on the part of the psychiatrist has a distinct and possibly more distinct value than various material tests and laboratory experiments, certainly at present. The reviewer also feels that such self-analytical books as Beer's, "The Mind that Found Itself," have thrown great light on psychiatry.

BEVERLEY R. TUCKER, M. D.

Clinical Laboratory Methods and Diagnosis. A Textbook on Laboratory Procedures, with Their Interpretation. By R. B. H. GRADWOHL, M. D., Director of the Gradwohl Laboratories; Director of Laboratories, St. Louis County Hospital; Chief of Staff and Pathologist to Christian Hospital, etc. St. Louis. The C. V. Mosby Company. 1935. Octavo of 1028 pages, with 328 illustrations in the text and 24 color plates. Cloth. Price, $8.50.

The two weeks' time allotted to the review of this volume is hardly sufficient for more than a cursory survey of its contents. The many formulae, equations, charts, tables, etc., could not be thoroughly checked but the few checked were found to be accurate. The volume is profusely illustrated, there being 328 illustrations, most of which are excellent and helpful. A few, however, are very poor.

The book was written to aid, not only the laboratory worker and medical student, but the clinician as well, and considerable clinical data are given with interpretations of laboratory findings in various conditions, which gives the book a very practical application.

Chapter I deals with general considerations such as the use and care of the microscope, photomicrography, metric weights and measures, normal solutions, per cent solutions and explanation of hydrogen ion concentration. These things are explained in detail and are especially valuable for technicians, student technicians and medical students. Chapter II deals with urinalysis and interpretation of urinary findings in various conditions. In Chapters III and IV the subjects of blood chemistry and hematology are fully covered. Chapters V, VI and VII cover gastric analysis, examination of duodenal contents, examination of puncture fluids and sputum. Chapter VIII gives special tests such as test for rabies, tests for pregnancy, hypersensitiveness, atopy, chemical analysis of milk, mycological diagnosis, autogenous vaccines and semen appraisal. Chapters IX and X deal with feces, parasitology and diseases due to changed nutritional conditions. Chapters XI and XII give the bacteriologic applications to clinical diagnosis and serology. Under serology both complement fixation and precipitation tests are given and the precipitin test for the identification of human blood. Chapter XIII deals with basal metabolism tests and Chapter XIV with post-mortem examinations. Chapters XV and XVI give technics for tissue cutting and staining and preparation of museum specimens. Chapter XVII deals with toxicologic technic and Chapter XVIII discusses the minimum supplies, equipment and reagents needed for pathologic laboratories.

It can be seen from this brief outline that the volume contains practically all of the tests that would be used in a clinical laboratory, giving one or more standard methods and usually references, so that one might have easy access to additional information on the methods given. I feel that this volume would be a welcome addition to any laboratory library.

REGENA C. BECK, M. D.

XUM

Virginia Medical Monthly

Founded by LANDON B. EDWARDS, M. D., April, 1874
Owned by MEDICAL SOCIETY OF VIRGINIA since November, 1919
WYNDHAM B. BLANTON, M. D., *Editor*
AGNES V. EDWARDS, Richmond, *Business Manager*

PUBLICATION COMMITTEE
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All correspondence regarding editorial matters, articles, advertisements, subscription rates, etc., should be addressed to the Monthly, 1200 East Clay Street, Richmond, Va.

This journal is not responsible for the opinions and statements of its contributors.

All advertisements are received subject to the approval of the Council on Pharmacy and Chemistry of the American Medical Association.

Subscription Price: $2.00 per annum in advance. Single Copies 25c.

VOLUME 62 SEPTEMBER, 1935 No. 6

Editorial

The Paradoxes of Poliomyelitis.

We call it infantile paralysis, but only a small proportion of its victims are infants, and less than one out of sixteen who are attacked by the disease develop paralysis, and many of these recover muscle function almost completely.

The spread of no other disease occasions such general alarm as poliomyelitis, and yet there has never been a pandemic such as has frequently occurred of influenza for example. When outbreaks of poliomyelitis have assumed epidemic proportion they have been remarkably restricted, rarely exceeding in this country the boundaries of more than one or two states.

Although undoubted instances of its sporadic manifestations are on record as early as the time of ancient Egypt and we are now accustomed to look upon it as one of our common epidemic diseases, the first well-known record of the epidemiological manifestations of poliomyelitis (Medin) is hardly fifty years old.

Most epidemic diseases show fairly predictable periodicity—measles for instance. The outbreaks of poliomyelitis are extremely irregular and do not conform to recognized epidemiological laws.

The fact that individuals who have poliomyelitis usually enjoy life-long immunity from a second attack, and that experimentally animals show resistance to reinfection, suggests the presence of antibodies of high titre in the so-called immune serum. Yet, in a number of instances, carefully controlled attempts to abort the disease in the pre-paralytic stage by the use of immune serum have not produced convincing results.

Contrary to expectations the serum of normal persons, persons who are not supposed to have had poliomyelitis, appears to be about as effective in neutralizing emulsions of the virus as the so-called immune serum.

Although pathological studies suggest the intestinal tract as the portal of entry of the virus, recent animal research indicts the naso-pharynx, indicating extension along nerve fibres, and epidemiological study emphasizes the importance of droplet infection.

Although the cerebro-spinal lesions of poliomyelitis, particularly those of the anterior horn, have dominated pathological descriptions, it is widely claimed that poliomyelitis is primarily a disease of the reticuloendothelial system with widespread evidence of general lymphoid hyperplasia.

Although the disease strikes rich and poor alike, the favored as well as the unfavored, certain individuals appear to be practically immune to its ravages. They are those persons who are the fortunate possessors of the so-called B agglutinins in their blood.

Although spinal puncture has been highly re-

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garded as a therapeutic procedure, there seems to be accumulating evidence that in those instances in which it is resorted to before the disease has reached the cord structures, or where an excessive amount of cerebro-spinal fluid is withdrawn, it may do actual harm.

Although a mononucleosis is usually described as the typical cell change in the spinal fluid of poliomyelitis, in many instances a polymorphonuclear leucocytosis is the finding.

The Drinker respirator is popularly regarded as a life saver in the bulbar type of case, but those with experience in the use of this apparatus now tell us that it may do more harm than good, and that its use should be restricted to those spinal cases in which there is weakness or paralysis of the accessory muscles of respiration.

Although the disease is still generally considered a systemic infection, at least in its earliest stage, the right of the general practitioner to assume complete management of it has been challenged by at least three specialists—the neurologist, who maintains that its cerebro-spinal manifestations place the disease in his domain, the orthopedist, who views its crippling and deforming sequelae as peculiarly entitling him to the care and treatment of the disease even in its acute manifestations, and the pediatrician who quite naturally considers the age incidence of the disease as entitling him to certain priorities.

Vaccination in Poliomyelitis.

Two vaccines are prominently before the medical profession at the present time.

Kolmer's vaccine is a pooled 5 per cent suspension of the emulsified cords of poliomyelitic monkeys in 1 per cent sodium ricinoleate to which has been added 1:80,000 phenyl mercuric nitrate. It is administered in three weekly ascending doses of from .5 c.c. to 2 c.c. according to the age of the patient. Aside from slight local reactions few untoward effects have been reported. Kolmer and others have showed that this type of vaccine protects monkeys from otherwise fatal doses of poliomyelitis virus. He has showed also in a small group of twenty-five children of various ages that 75 per cent of those without the presence of antibodies in their blood before vaccination develop large amounts (as demonstrated by virus neutralization tests) as early as one week after the last dose of vaccine.

It is recognized that Kolmer's vaccine consist of a live though attenuated poliomyelitis virus (virus that has been fixed by repeated animal passage and whose virulence has been lessened by th addition of sodium ricinoleate). The vaccine i capable of giving poliomyelitis to monkeys if administered intracerebrally in sufficient doses. It i believed that the virus actually multiplies after i has been injected into the human body, the size o the dose and the route of inoculation making thi a favorable rather than an unfavorable result. The duration of immunity conferred by the vaccine is unknown. Kolmer has to date inoculated more than 6,000 children with it without any untoward results. It may be obtained directly from him at small cost.

Brodie's vaccine consists of a 10 per cent virus suspension of the emulsified cords of monkeys inactivated with .1 per cent of formalin for from sixteen to forty-eight hours. It is given in a single 5 c.c. dose or repeated after ten days. The latter method is said to give greater protection. Brodie's vaccine has now been given to more than 4,000 children with only negligible reactions and he considers it perfectly safe as no amount of the vaccine injected intracerebrally in monkeys is capable of producing the disease. Demonstrable antiviral substances can be shown in the sera of vaccinated children and it is believed that the degree of protection is "quite appreciable." Brodie's vaccine while being employed experimentally on an extensive scale is still not commercially available.

The average doctor will want to know are these vaccines safe? Do they produce immunity? Is the immunity sufficient to protect against the disease? And how long does immunity last? The last two questions appear to be yet unanswered.

Serum in Poliomyelitis.

The case for serum may be summarized briefly by saying that poliomyelitis is considered by many to begin as a systemic disease (pre-paralytic stage) with a definite period during which the central nervous system is not involved and during which theoretically an antibody potent serum should prevent paralysis. Antibodies capable of neutralizing poliomyelitis virus c e demonstrated in the blood of convalescents and even in certain normal individuals. A number of investigators have reported

the favorable use of convalescent serum clinically in several large series of cases.

On the other side it is argued that poliomyelitis is not a systemic disease at any time but a neurological disease from the onset, that virus is fixed to nerve tissue possibly as early as the period of incubation, that serum cannot reach the virus by the blood route and that even if it could there is evidence to show that the virus can multiply even in its presence. Even large doses of immune serum have failed to protect monkeys from infective doses of virus if given after inoculation. In those instances in which clinical trials of convalescent serum have been carefully controlled and used on a sufficiently large scale no convincing results have been shown to follow its use.

The Ideal Immune Serum.

Landon and Smith in their *Handbook* on poliomyelitis suggest several criteria for a theoretically effective convalescent serum in the treatment of acute anterior poliomyelitis. According to them it should be of known neutralizing titre. It should be obtained from a woman possessed of the B type of agglutinin and should be collected during the third month of pregnancy. The donor must have recently recovered from an abortive attack of poliomyelitis. Finally it should be administered in sufficiently large dosage.

Better Diagnosis in Suspected Enteric Infections.

The Widal reaction has long served a useful diagnostic purpose, but for a number of years physicians have recognized that certain of its results may be misleading unless interpreted in the light of the patient's past history. A previous enteric infection or vaccination, especially in the presence of an acute febrile disease, was known to be sometimes provocative of a positive agglutination reaction when typhoid fever or paratyphoid fever was not at the time responsible for the patient's symptoms.

Within recent years, due chiefly to the work of Felix, it has become possible by laboratory procedures interpreted in terms of the patient's history to distinguish between active cases of enteric infection and those in which some non-specific infection has aroused the latent agglutination properties of the blood serum. This whole subject is briefly and clearly set forth in Miss Corpening's article which appears elsewhere in this issue of the MONTHLY.

Department of Clinical and Medical Education of the Medical Society of Virginia

Pediatric Clinics.

The fourth and last of the clinics in Pediatrics conducted by this Department during the year was completed on August 2nd. The clinic was sponsored by the Norfolk County Medical Society and meetings were held daily for two weeks in the Kings Daughters Clinic Building in Norfolk. The clinician for the course was Dr. George M. Lyon, Specialist in Pediatrics, of Huntington, W. Va. The following physicians were in attendance:

Dr. E. Ray Altizer
Dr. T. W. Blanchard
Dr. T. L. Brooks
Dr. A. M. Burfoot
Dr. W. L. Harris
Dr. W. A. Hoggard
Dr. W. P. McDowell
Dr. P. St. L. Moncure
Dr. F. N. Mullen, Jr.
Dr. J. L. Rawls
Dr. L. N. Simpson
Dr. J. R. Spencer
Dr. F. D. Wilson

During the year the Department has held four clinics in the following places:

	Members	*Visitors*
South Boston	14	2
Christiansburg	11	4
Nassawadox	12	3
Norfolk	8	5
Total	45	14

Dr. Samuel F. Ravenel, of Greensboro, N. C., conducted the first two clinics and Dr. George M. Lyon was the Clinician for the courses at Nassawadox and Norfolk.

GEORGE B. ZEHMER,
Executive Secretary.

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Proceedings of Societies

Augusta County Medical Association.

At the regular quarterly meeting of this Association, held at the Fairway Tavern, near Staunton, on August 7th, the following officers were elected: President Dr. T. R. Rolston, New Hope; vice-presidents, Dr. H. B. Webb, Waynesboro, and Dr. Charles Rodgers, Staunton; secretary, Dr. A. F. Robertson (re-elected), Staunton; and treasurer, Dr. T. M. Parkins (re-elected), Staunton. Delegate and alternate to the State Society meeting were also elected.

A paper was presented by Dr. L. Nelson Bell, Waynesboro, his subject being Medical and Surgical Problems in China. The retiring president, Dr. C. P. Obenschain, Staunton, spoke on Relief of Suffering During Confinement. Dr. Kenneth Maxcy, University, Va., conducted a discussion on Infantile Paralysis.

Fairfax County Medical Society.

At the regular August meeting of this Society, held at Herndon, Va., the following officers were re-elected: President, Dr. Jessie Thornton Scott Vienna; Dr. F. M. Brooks, Fairfax, treasurer; and Dr. E. S. Waring, Fairfax, secretary. Dr. Sigmund Newman is the newly elected vice-president. Delegate and alternate to the State Society were also named at this time.

The Mid-Tidewater Medical Society

Met at the home of Dr. H. A. Tabb, Gloucester Court House, recently. Dr. R. D. Bates presided in the absence of the president, Dr. E. L. W. Ferry.

Papers were read by Dr. O. T. Amory, Newport News, on "Indigestion"; and Dr. E. L. Alexander, Newport News, on "Antigens and Vaccines and the Uses." Both of these papers were discussed by members and visitors.

Delegates and alternates to the State Society meeting were also elected at this time.

A delicious luncheon was served the members and their visitors by the physicians of Gloucester County, after which they were entertained by a sail on Dr. Blair Spencer's boat.

News Notes

Norfolk Meeting of the State Society.

Now that summer vacations are coming to an end, the attention of the doctors of the State should be focused on the annual meeting of the Medical Society of Virginia to be held in Norfolk, October 15th, 16th and 17th, under the presidency of Dr. F. H. Smith, of Abingdon. This gives promise of being a meeting of great interest and a large attendance is expected.

Several years ago, the Council of the State Society decided that it was too great a burden to impose on a local society to tax its members for entertainment and, in response to a resolution adopted at that time, there has been no entertainment planned for members at the last three sessions. However, feeling that a get-together of the members would add to the interest of the meeting, the Norfolk committee with the approval of the Council has decided to have a subscription oyster roast, each person attending to pay for his own ticket. These tickets, at $1.50 each, may be obtained at the Registration desk at the time of registration. The oyster roast will be on Lynnhaven Bay, twelve miles from the city, on Thursday afternoon, immediately following the morning session, and in time for the doctors to get off on afternoon trains. Transportation will be provided for those who do not have their own automobiles. We hope all members may be able to stay through the meeting for this event.

May we suggest once again that hotel reservations be made in advance if possible, to avoid some of the last minute rush. Names of Norfolk hotels were given in the August issue of the MONTHLY.

Inter-State Postgraduate Medical Association of North America.

The International Assembly of the Inter-State Postgraduate Medical Association of North America

will be held in Detroit, Mich., October 14, 15, 16, 17 and 18, 1935, with pre-assembly clinics on Saturday, October 12th, and post-assembly clinics Saturday, October 19th, in the Detroit Hosptials.

The Association through its officers and members of the program committee extends a very cordial invitation to all physicians in good standing in their State and Provincial Medical Societies to attend the Assembly. An unusual clinical and didactic program including all branches of medicine and surgery and the specialties has been arranged by the program committee.

Attention is called to the list of distinguished teachers and clinicians who will take part on the program which appears on page 24 of the advertising section of this journal.

Dr. Charles H. Mayo, Rochester, Minn., is president of this Association and Dr. William B. Peck, Freeport, Ill., is managing director.

Registration fee of $5.00 admits all members of the profession in good standing.

Dr. R. A. Vonderlehr

Has been detailed as Assistant Surgeon-General in charge of the Division of Venereal Diseases, Bureau of the Public Health Service, Washington, D. C.

Dr. and Mrs. Wm. F. Grigg,

Richmond, Va., have recently moved into their new home at 811 West Franklin Street.

Dr. William Bickers,

Medical College of Virginia, Class of '33, and recent house officer and resident surgeon at the Boston City Hospital in obstetrical and gynecological service, has located in the Medical Arts Building, Richmond, Va. He will limit his practice to obstetrics and gynecology.

Dr. W. L. Thomas, Jr.,

After completing a residency in obstetrics and gynecology at the Duke Hospital, Durham, N. C., is studying obstetrics and gynecology at the Henry Ford Hospital, Detroit, and the University of Michigan, Ann Arbor. He will leave shortly for a year's study in Edinburgh, Brussels, Paris, Budapest, Vienna, Berlin, and Rome. Dr. Thomas graduated from the University of Virginia, Department of Medicine, in 1931.

Medical College of Virginia News.

The report for the fiscal year 1934-35 for the outpatient department of the college shows 66,094 patient visits made by 16,356 individual patients. Four hundred and eighty-three different diseases and conditions were treated, 24,700 laboratory tests of various types made, and 25,189 prescriptions filled for patients.

The Public Works Administration has approved a loan and grant of $61,000.00 for the construction of a new laundry, which will be under way in the near future.

Dr. Harry Bear, dean of the school of dentistry, is spending a month in Europe.

Dr. Walter E. Vest, of Huntington, W. Va., was a recent college visitor.

The ninety-eighth session of the college will begin September 17th.

Dr. Paul Kimmelstiel, of the Mallory Institute of Pathology, Boston, Mass., has accepted a position as associate in pathology and will join the college staff on September 1st.

Dean Wortley F. Rudd of the school of pharmacy attended the eighty-third annual convention of the American Pharmaceutical Association in Portland, Ore.

A new Drinker artificial respirator has been installed in Memorial Hospital, one of the few machines of its kind in Virginia.

Dr. H. C. Spalding,

Richmond, Va., announces the removal of his offices from the Professional Building to 805 West Franklin Street. He will continue his work in obstetrics and gynecology.

Dr. C. C. Hatfield

Has located for practice at Glade Spring, Va. He was recently at the St. Vincent's Hospital in Erie, Pa.

Dr. Griffith President of Waynesboro Board of Health.

At an organization meeting of the Board of Health of Waynesboro, Va., Dr. R. S. Griffith was elected president and Dr. Ernest Mosby secretary, with Dr. J. F. Hubbard as the other member.

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Married.

Dr. Adam Tyree Finch, Chase City, and Miss Anne Reynolds Georghegan, Richmond, August 5th. Dr. Finch is a graduate in medicine from the University of Virginia, class of '31.

Dr. Joseph Judson Waff and Miss Mary Elizabeth Hopkins, Shenandoah, Va., August 4th.

Dr. George Hatcher Snead, Richmond, Va., and Mrs. Elizabeth Simmerman Huff, Pulaski, Va., August 17th.

Dr. Warren Coons Corwin, University, Va., and Miss Ella Macha, Baltimore, Md., June 22nd.

Dr. Earle Carlton Gates, class of '32, Medical College of Virginia, now at Fortress Monroe, Va., and Miss Marian Montford Janssen, Kenbridge, Va., August 15th.

Dr. William Morgan Chew, New York, N. Y., of the class of '31, University of Virginia, and Miss Katharine Imelda Salmon, New York, N. Y., August 14th.

Dr. George Alfred Hess, Bridgewater, Va., of the class of '34, University of Virginia, and Miss Helen May Carter, Trenton, N. J., August 18th.

The American Public Health Association

And related organizations will meet in Milwaukee, October 7th-12th, and more than 2,000 professional public health workers are expected to attend.

The scientific program consists of 400 presentations. This year, for the first time, an entire session will be devoted to mental hygiene.

The preliminary program of this session will be published in full in the September issue of the *American Journal of Public Health* and further information may be obtained from the American Public Health Association, 50 West 50th Street, New York.

Dr. Thomas B. Payne

Has been named health officer of Fredericksburg, Va., to succeed Dr. J. Lee Cooke, who died in August.

Reliable Apparatus.

The American Medical Association has issued a small pamphlet containing a list of the apparatus accepted by the Council on Physical Therapy, the first one published under the direction and supervision of the Council. One of the purposes of the Council on Physical Therapy is to protect the medical profession, and thereby the public, against inefficient and possibly dangerous apparatus and against misleading and deceptive advertising in connection with the manufacture and sale of devices for physical therapy. In addition to the list and description of accepted apparatus, the pamphlet contains indications for the use of each type and a statement relative to efficacies and dangers.

Apparatus Accepted includes all the devices accepted by the Council prior to May, 1935. Any physician can obtain this pamphlet free by writing to the Secretary, Council on Physical Therapy, A. M. A., 535 North Dearborn Street, Chicago, Ill.

New Assistants to Dr. Wheeldon.

Dr. Robert Mazet, Jr., and Dr. Frank H. Hedges, Jr., have just been added to the staff of Dr. Thomas Wheeldon, Richmond, Va. Dr. Mazet is a graduate in medicine from Columbia University, College of Physicians and Surgeons, 1928, with hospital experience at the Presbyterian Hospital and the Hospital for Ruptured and Crippled in New York City. Dr. Hedges is a graduate from the same school in the class of 1930 and has done work abroad in pathology in addition to his hospital experience at Johns Hopkins Hospital and the Church Home and Infirmary in Baltimore.

Dr. A. Chester Stutsman,

Class of '31, University of Virginia, has recently located in Humboldt Building, St. Louis, Mo., where he is associated with Dr. M. F. Arbuckle in the practice of otolaryngology. He has received an appointment on the visiting staff of the St. Louis City Hospital in his specialty and has been named an assistant in clinical otolaryngology at Washington University. After leaving the University of Virginia, Dr. Stutsman served a rotating internship at the Church Home and Infirmary, Baltimore, and then went to St. Louis where he did special work at Barnes Hospital and later at the St. Louis City Hospital.

Dr. Frank A. Strickler,

Class of '32, University of Virginia, is now at the Payne-Whitney Psychiatric Clinic of the New York Hospital where he will be until September, 1936. Dr. Strickler has been serving a residency at the University of Virginia Hospital.

Dr. Glenn T. Foust,

Norton, Va., was elected one of the vice-presidents of the Tennessee Valley Medical Association,

at its first annual session held recently. This association is composed of physicians residing in eastern Kentucky and Tennessee, western Virginia and North Carolina, and parts of Alabama and Georgia.

Dr. William A. Farmer.

Is now located at the Puunene Hospital, Puunene, Maui, T. H., after being for a short time in Anderson, S. C.

Dr. and Mrs. L. E. Cockrell,

Reedville, Va., have returned home after a trip to Boston, Mass., and Bangor, Maine.

United States Civil Service Examination.

The U. S. Civil Service Commission has announced open competitive examinations for a number of specialist positions in the U. S. Public Health Service, Treasury Department. Applications must be on file with the U. S. Civil Service Commission, Washington, D. C., not later than September 9, 1935. These positions include several grades of bacteriologist, cytologist, epidemiologist, and mycologist (medical) positions, and the position of senior pathologist (medical).

Dr. Willis F. Evans,

Class of '33, Medical College of Virginia, has located for general practice at Williamston, N. C. He has just completed a two years' service at the Medical College of Virginia Hospital.

Dr. Wilbur M. Bowman,

Petersburg, Va., is the first Virginia physician to become a member of the recently organized American Neisserian Medical Society. Membership in this organization is based upon outstanding work along certain definite branches of the profession.

Dr. Thomas F. Wheeldon,

Richmond, Va., has been named to the orthopedic advisory committee of President Roosevelt's Georgia Warm Springs Foundation.

"On Health's Highway."

This book is designed to present to the public some of the facts regarding the role played by animals in the study of scientific medicine, and of the great value of the advances accomplished by this means, particularly with reference to cancer. It is fully illustrated and covers from the time of Hippocrates to the present day.

Copies of the pamphlet (price 50 cents) may be obtained from the New York City Cancer Committee, 150 East 83rd St., New York.

Dr. and Mrs. Robert Bryan,

Richmond, Va., sailed in July on the *S. S. President Johnson* for a cruise around the world.

The Association of Military Surgeons of the United States

Is to hold its forty-third annual convention at the Waldorf-Astoria Hotel, New York City, October 3rd, 4th and 5th. An excellent program, offering discussions by outstanding men of the country, on the latest scientific phases of medicine, surgery, hygiene and hospital methods, will be presented. In addition, a large number of exhibits by leading medical and surgical supply houses and various Government agencies will be on display.

The Association, through its secretary, Major General H. L. Gilchrist, U. S. Army, Ret., Washington, D. C., extends to the members of our Society a cordial invitation to attend all meetings.

Dr. R. R. Hoskins,

Mathews Va., was named one of the delegates from the American Legion, Mathews-Gloucester Post, to the Virginia Department convention of the American Legion, to be held at Virginia Beach, Va., September 4th-7th.

Dr. Horsley Gantt,

A native of Nelson County, Virginia, but now of Baltimore, Md., was among the speakers at the International Physiological Congress in Leningrad, in August. Only the most prominent workers in physiology in the world were invited to this Congress, and we are pleased to note that one of these is a former Virginian. Dr. Gantt studied under Pavlov in Russia for several years and it is of interest to note that Dr. Pavlov, now about eighty-five years of age, was president of this Congress.

Dr. and Mrs. R. Angus Nichols, Jr.

Have returned to their home in Richmond after a cruise on the *S. S. Georgic* to Halifax, Nova Scotia. Before returning home, they also visited in New York.

For Sale—

One A.C.M.I. Antroscope, complete in case, and one specialist's instrument and treatment cabinet. Address Acmi, care of VIRGINIA MEDICAL MONTHLY. (*Adv.*)

XUM

Doctor Wanted.

Wanted a physician who can do laboratory and X-ray work. Address "Lab," care of this journal. (*Adv.*)

For Sale.

Burdick Ultra-violet lamp. Perfect condition. Cost $365.00. No reasonable offer refused. Address "Burdick Lamp," care VIRGINIA MEDICAL MONTHLY, Richmond, Va. (*Adv.*)

Wanted.

Assistant physician in Glenwood Park Sanitarium. Young man preferred. Address Dr. W. C. Ashworth, Glenwood Park Sanitarium, Greensboro, N. C. (*Adv.*)

Obituary Record

Dr. William Wallace Bennett,

Blackstone, Va., died August 3rd, following an illness of several weeks. He was born in Ashland, Va., and was sixty-five years of age. Dr. Bennett graduated from the former University College of Medicine, Richmond, in 1899. He had practiced in Blackstone for the past eighteen years. Dr. Bennett was a Mason and a Shriner and had been a member of the Medical Society of Virginia for thirty-five years. His wife and a daughter survive him.

Dr. David James King,

Williamsburg, Va., died August 18th, following an illness of two years. He was seventy-one years of age and a graduate of the Buffalo University in 1900. He had been a resident of Williamsburg for over twenty years and physician to William and Mary College for the past nineteen years. He was a charter member of the Rotary Club and active in the civic and professional life of his community. Dr. King was formerly president of his local society and was a member of the Medical Society of Virginia. He is survived by his wife, a twin brother and a sister.

Dr. Joseph Stuart Hume,

Beloved Norfolk, Va., specialist, died July 29th, after a brief illness with heart trouble and complications. He was forty-six years of age and received his medical degree from the University of Virginia in 1912. Following his graduation, Dr. Hume specialized in eye, ear, nose and throat work in two New York hospitals, after which he saw service in the World War, practicing his specialty at the Base Hospital 41. Upon his return from France, he entered practice in Norfolk. Dr. Hume had been a member of the Medical Society of Virginia for fifteen years. His wife and two children survive him.

Dr. Justus Lee Cooke,

Prominent physician of Fredericksburg, Va., died suddenly August 6th. He was sixty-two years of age and a graduate of the Columbia University College of Physicians and Surgeons, New York, in 1893. Dr. Cooke had been located in Fredericksburg for twenty-two years and at the time of his death, he was city health officer. He took a prominent part in civic activities and had been a member of the Medical Society of Virginia for fifteen years He is survived by his wife and two sons.

Dr. Albert C. Stephens,

Barren Springs, Va., died May 15th, of angina pectoris. He was sixty-five years of age and a graduate of the University of Maryland, School of Medicine, in 1894. Dr. Stephens had been a member of the Medical Society of Virginia for fifteen years.

Dr. William D. Sydnor,

Hamilton, Va., died August 9th, after having been in ill health for some time. He was fifty-nine years of age. Dr. Sydnor was a Mason and a Shriner. His wife and four children survive him.

Dr. James Wilton Thurman,

Pizarro, Va., died July 23rd, following a month's illness. He was seventy-nine years of age and graduated in medicine from the University of Virginia in 1883. A daughter survives him.

Dr. Albert De Kalb Parrott,

Kinston, N. C., died April 19th of chronic myocarditis. He was fifty-two years of age and graduated from the former University College of Medicine, Richmond, Va., in 1906.

Dr. William Harvey Dixon,

Ayden, N. C., died May 29th of angina pectoris. He was sixty-two years of age and a graduate of the Medical College of Virginia in 1901.

Dr. Robert Douglas Roller, Jr.,

Charleston, W. Va., died August 10th, when his car plunged over an embankment. He was a native of Richmond, Va., and was fifty-six years of age. Dr. Roller graduated from the former University College of Medicine, Richmond, Va., in 1905.